

## **TITLE 13. CALIFORNIA AIR RESOURCES BOARD**

### **NOTICE OF PUBLIC HEARING TO CONSIDER AMENDMENTS TO THE VERIFICATION PROCEDURE, WARRANTY AND IN-USE COMPLIANCE REQUIREMENTS FOR IN-USE STRATEGIES TO CONTROL EMISSIONS FROM DIESEL ENGINES**

The Air Resources Board (the Board or ARB) will conduct a public hearing at the time and place noted below to consider amendments to the Verification Procedure, Warranty and In-Use Compliance Requirements for In-Use Strategies to Control Emissions from Diesel Engines.

DATE: December 11, 2003

TIME: 9:00 a.m.

PLACE: California Environmental Protection Agency  
Air Resources Board  
Central Valley Auditorium  
1001 "I" Street  
Sacramento, CA 95814

This item will be considered at a two-day meeting of the Board, which will commence at 9:00 a.m., December 11, 2003, and may continue at 8:30 a.m., December 12, 2003. This item may not be considered until December 12, 2003. Please consult the agenda for the meeting, which will be available at least 10 days before December 11, 2003, to determine the day on which this item will be considered.

If you have special accommodation or language needs, please contact the ARB's Clerk of the Board at (916) 322-5594 or [sdorais@arb.ca.gov](mailto:sdorais@arb.ca.gov) as soon as possible. TTY/TDD/Speech-to-Speech users may dial 7-1-1 for the California Relay Service.

### **INFORMATIVE DIGEST OF PROPOSED ACTION AND POLICY STATEMENT OVERVIEW**

**Sections Affected:** Proposed amendments to sections 2701, 2702, 2703, 2704, 2705, 2706, and 2707, title 13, California Code of Regulations (CCR).

**Background:** In 1998 the Air Resources Board (ARB or Board) identified diesel particulate matter emissions from diesel-fueled engines as a toxic air contaminant (title 17, CCR, section 93000). The ARB adopted the Diesel Risk Reduction Plan (DRRP or Plan) in 2000, which established a goal of reducing emissions and the resultant health risk from virtually all diesel-fueled engines and vehicles within the State of California by the year 2020. The Plan envisioned that

diesel particulate matter emissions should be reduced by 75 percent in 2010 and 85 percent in 2020. To achieve those goals, the Plan identified various methods including more stringent standards for all new diesel-fueled engines and vehicles, the use of diesel emission control strategies on in-use engines, and the use of low-sulfur diesel fuel.

To carry out the component of the DRRP that concerns implementation of in-use emission control strategies, ARB staff developed a procedure to verify emissions reductions achieved by strategies, which also includes warranty and in-use compliance requirements (the Procedure). The Board approved the Procedure at the May 16, 2002 public hearing with various modifications. The modifications to the Procedure were distributed with the Notice of Public Availability of Modified Text, released on January 29, 2003. The modifications and the rationale behind them are described in that notice.

Both during and after the periods of public comment, staff has maintained a dialogue with stakeholders. As a result of this on-going dialogue, staff determined that changes could be made to improve the Procedure and better enable ARB to meet the goals of the Plan. The proposed changes are briefly described in the next section.

**Proposed Amendments:** Summarized below are the four most significant proposed amendments to the Procedure. Additional proposed amendments include minor definitional changes and clarifications, which are shown in the Initial Statement of Reasons and the attachments thereto.

- (1) Warranty requirements: In developing the warranty requirements for verification, staff tried to strike a balance between the interests of the end-users and the manufacturers of emission control systems. Sometimes, the views of the two groups can seem to be almost diametrically opposed. Nevertheless, staff recognizes that it is imperative that Californians' exposure to diesel particulate matter be reduced to the greatest extent possible and that a viable warranty is necessary to achieve this goal. Achieving this goal is in jeopardy because the manufacturers of diesel emissions control strategies perceive that the current warranty requirement presents them with too great a liability to participate in the verification process, and end-users perceive it as providing insufficient consumer protection.

Subsequent to the approval of the Procedure by the Board, manufacturers of diesel emission control strategies began voicing significant concerns to staff regarding the Procedure's warranty requirements. Although manufacturers' concerns over the warranty were lessened by various clarifications made by staff, they were not completely resolved. Full resolution will require that the Board consider amendments to the Procedure. The mandatory warranty for verified diesel emission control systems currently includes coverage of damage to the engine and vehicle or equipment that is proximately caused

by the control system. It is primarily the inclusion of the vehicle or equipment in the warranty coverage that has prevented manufacturers of emission control systems from agreeing to participate in the verification process. Their primary concern is the potential for end-users to make spurious claims with the goal of obtaining new vehicles or equipment.

The California Trucking Association (CTA), representing end-users, has repeatedly stated that the duration of warranty coverage is insufficient. Even if coverage of vehicle/equipment damage is removed, staff points out that the warranty affords far more protection than that required under the United States Environmental Protection Agency's (U.S. EPA) Urban Bus Retrofit/Rebuild program, which was another mandatory emission control effort directed at in-use fleets. As with warranties offered by engine manufacturers, the U.S. EPA's required warranty did not include coverage of vehicle/equipment damage. In addition, it has been staff's experience that the potential for a verified emission control strategy to cause non-engine related damage is minimal. In the unlikely event that such damage should occur, however, all the standard avenues for relief from secondary damages remain intact. Therefore, even without coverage of vehicle/equipment damage, staff does not believe that end-users would be left without relief. Moreover, there will be no cost impacts associated with the proposed amendment.

In an effort to achieve the goals of the DRRP while still maintaining a reasonable degree of consumer protection, staff therefore proposes that mandatory warranty coverage extend only to the engine, and not to the vehicle or equipment with which the control system is used.

- (2) NO<sub>2</sub> Limit: Another component of the Procedure in need of amendment relates to the nitrogen dioxide (NO<sub>2</sub>) emission limit. The Procedure currently states that beginning on January 1, 2004, post-control NO<sub>2</sub> emissions from an engine using a diesel emission control strategy must not exceed 20 percent of the total baseline (pre-control) NO<sub>x</sub> emissions. After that date, systems that do not meet the limit will not be verified and may not be installed. At present, the effective date is only months away and no Level 3 systems have been verified that meet the NO<sub>2</sub> limit. Therefore, unless new compliant systems are verified soon, California stands to lose valuable early field experience and PM reductions that can be gained prior to the implementation of proposed rules that would require installation of a verified diesel emission control strategy on certain vehicle fleets. Furthermore, significant questions have arisen surrounding the accuracy of the assumptions that led to selection of the 20 percent limit and the nature of engine-out NO<sub>2</sub> emissions. For those reasons, staff proposes that the effective date of the NO<sub>2</sub> limit be changed from January 1, 2004 to January 1, 2007. The three-year delay should give staff the time it needs to gather additional data and develop a better understanding of the questions

surrounding the NO<sub>2</sub> issue. It will also give manufacturers more time for product development aimed at reducing NO<sub>2</sub> emissions. To prevent possible negative side-effects of higher NO<sub>2</sub> emissions, the delay ends before widespread implementation of diesel emission control strategies is expected to occur. The delay also eliminates the potential for economic impact arising from the amendments.

- (3) Proposed Verification Testing Protocol: Section 2702(b) of the Procedure describes the requirements for the Proposed Verification Testing Protocol that the applicant must prepare. One of the subsections of the protocol requires that the applicant describe its system's principles of operation. Staff must develop a good understanding of the system for several reasons, principal among them being the need to determine whether additional analyses for other harmful pollutants are necessary. The Procedure currently lacks a formal process for handling those control systems that appear to rely on principles not generally understood or accepted by the scientific world. To fill that need, staff proposes that the applicant must demonstrate that its product relies on sound principles of science and engineering to achieve emission reductions. If the Executive Officer determines that the applicant has not made a satisfactory demonstration after two attempts, the application may be suspended. If an application has been suspended, it may only be reactivated at the discretion of the Executive Officer. Staff also proposes that if at any point in the verification process the Executive Officer has reason to doubt the scientific or engineering soundness of a product, the Executive Officer can require the applicant to provide further substantiation or risk suspension of the application or revocation of an existing verification.
- (4) Harmonization of Durability Requirements: The Procedure requires that the applicant conduct emission reduction testing with the diesel emission control strategy both before and after the service accumulation period. The verification protocol used to support the U.S. EPA Voluntary Diesel Retrofit Program calls for testing of both a pre-conditioned (or "de-greened") unit and an aged unit at the same point in time, with testing of a single unit at two different times (before and after service accumulation) left as an option. The primary advantages of the first option are that it reduces the cost of testing and minimizes test condition variability to the extent that the two units are indeed identical. To further harmonize with U.S. EPA's program and to offer more flexibility to applicants, staff proposes that the applicant be allowed to request that the Executive Officer consider the testing of two identical units, one that has been pre-conditioned and another that has completed the service accumulation period. In reviewing the request, the Executive Officer may consider all relevant information, such as whether a system causes any changes in engine operation over time and the quality of the evidence the applicant can provide to support that the two units are identical.

## **COMPARABLE FEDERAL REGULATIONS**

The U.S. EPA has published a draft document, "General Verification Protocol for Diesel Exhaust Catalysts, Particulate Filters, and Engine Modification Control Technologies for Highway and Nonroad Use Diesel Engines," but has not promulgated formal regulations for this verification protocol. This verification protocol is intended to support the voluntary retrofit programs initiated by the U.S. EPA, while the staff's proposal is to support the ARB's Diesel Risk Reduction Plan.

## **AVAILABILITY OF DOCUMENTS AND AGENCY CONTACT PERSONS**

The ARB staff has prepared a Staff Report: Initial Statement of Reasons (ISOR) for the proposed regulatory action, which includes a summary of the environmental and economic impacts of the proposal.

Copies of the ISOR and the full text of the proposed regulatory language may be accessed on ARB's web site listed below, or may be obtained from ARB's Public Information Office, Environmental Services Center, 1001 "I" Street, First Floor, Sacramento, CA 95814, (916) 322-2990, at least 45 days prior to the scheduled hearing (December 11, 2003).

Upon its completion, the Final Statement of Reasons (FSOR) will also be available and copies may be requested from the agency contact persons in this notice, or may be accessed on the web site listed below.

Inquiries concerning the substance of the proposed amendments may be directed to the designated agency contact persons, Mr. Paul Henderick, Air Resources Engineer, Retrofit Assessment Section, at (626) 350-6440, or Mr. Scott Rowland, Manager, Retrofit Assessment Section, at (626) 575-6972.

Further, the agency representative and designated back-up contact persons to whom non-substantive inquiries concerning the proposed administrative action may be directed are Artavia Edwards, Manager, Board Administration & Regulatory Coordination Unit, (916) 322-6070, or Amy Whiting, Regulations Coordinator, (916) 322-6533. The Board staff has compiled a record for this rulemaking action, which includes all information upon which the proposal is based. This material is available for inspection upon request to the contact persons.

If you are a person with a disability and desire to obtain this document in an alternative format, please contact the ARB's Clerk of the Board at (916) 322-5594 or [sdorais@arb.ca.gov](mailto:sdorais@arb.ca.gov) as soon as possible. TTY/TDD/Speech-to-Speech users may dial 7-1-1 for the California Relay Service.

This notice, the ISOR, and all subsequent regulatory documents, including the FSOR when completed, will be available on the ARB Internet site for this rulemaking at <http://www.arb.ca.gov/regact/verpro03/verpro03.htm>.

### **COSTS TO PUBLIC AGENCIES AND TO BUSINESSES AND PERSONS AFFECTED**

The determinations of the Board's Executive Officer concerning the costs or savings necessarily incurred by public agencies, private persons and businesses in reasonable compliance with the proposed regulations are presented below.

Pursuant to Government Code sections 11346.5(a)(5) and 11346.5(a)(6), the Executive Officer has determined that the proposed regulatory action will not create costs or savings, to any state agency or in federal funding to the State, costs or mandate to any local agency or school district whether or not reimbursable by the State pursuant to part 7 (commencing with section 17500), division 4, title 2 of the Government Code, or other non-discretionary savings to State or local agencies.

In developing this regulatory proposal, ARB staff evaluated the potential economic impacts on representative private persons or businesses. The ARB is not aware of any cost impacts that a representative private person or business would necessarily incur in reasonable compliance with the proposed action.

The Executive Officer has made an initial determination that the proposed regulatory action will not have a significant statewide adverse economic impact directly affecting businesses, including the ability of California businesses to compete with businesses in other states, or businesses directly affected.

In accordance with Government Code section 11346.3, the Executive Officer has determined that the proposed regulatory action will not affect the creation or elimination of jobs within the State of California, the creation of new businesses or elimination of existing businesses within California, or the expansion of businesses currently doing business within California. An assessment of the economic impacts of the proposed regulatory action can be found in the ISOR.

The Executive Officer has also determined, pursuant to Government Code section 11346.5(a)(3)(B), that the proposed regulatory action will not affect small businesses because participation in the Procedure is purely voluntary with respect to any business. There are no cost impacts that a representative private person or business would necessarily incur in reasonable compliance with the proposed action.

In accordance with Government Code sections 11346.3(c) and 11346.5(a)(11), the ARB's Executive Officer has found that the reporting requirements of the

regulation which apply to businesses are necessary for the health, safety, and welfare of the people of the State of California.

Before taking final action on the proposed regulatory action, the Board must determine that no alternative considered by the agency would be more effective in carrying out the purpose for which the action is proposed or would be as effective and less burdensome to affected private persons than the proposed action.

### **SUBMITTAL OF COMMENTS**

The public may present comments relating to this matter orally or in writing at the hearing, and in writing or by e-mail before the hearing. To be considered by the Board, written submissions must be received by **no later than 12:00 noon, December 10, 2003** and addressed to the following:

Postal Mail is to be sent to:

Clerk of the Board  
Air Resources Board  
1001 "I" Street, 23rd Floor  
Sacramento, California 95814

Electronic mail is to be sent to: [verpro03@listserv.arb.ca.gov](mailto:verpro03@listserv.arb.ca.gov) and received at the ARB **no later than 12:00 noon, December 10, 2003**.

Facsimile submissions are to be transmitted to the Clerk of the Board at (916) 322-3928 and received at the ARB **no later than 12:00 noon, December 10, 2003**.

The Board requests, but does not require, that 30 copies of any written statement be submitted at least 10 days prior to the hearing so that ARB staff and Board Members have time to fully consider each comment. The ARB encourages members of the public to bring to the attention of the staff in advance of the hearing any suggestions for modification of the proposed regulatory action.

### **STATUTORY AUTHORITY AND REFERENCES**

This regulatory action is proposed under that authority granted in sections 39002, 39003, 39500, 39600, 39601, 39650-39675, 40000, 43000, 43000.5, 43011, 43013, 43018, and 43105, 43600, 43700 of the Health and Safety Code. This action is proposed to implement, interpret and make specific sections 39650-39675, 43000, 43009.5, 43013, 43018, 43101, 43104, 43105, 43106, 43107, and 43204-43205.5 of the Health and Safety Code and Title 17 California Code of Regulations section 93000.

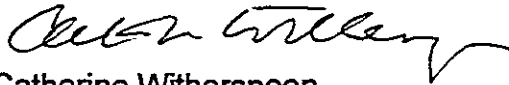
**HEARING PROCEDURES**

The public hearing will be conducted in accordance with the California Administrative Procedure Act, title 2, division 3, part 1, chapter 3.5 (commencing with section 11340) of the Government Code.

Following the public hearing, the Board may adopt the regulatory language as originally proposed, or with non-substantial or grammatical modifications. The Board may also adopt the proposed regulatory language with other modifications if the text as modified is sufficiently related to the originally proposed text that the public was adequately placed on notice that the regulatory language as modified could result from the proposed regulatory action; in such event the full regulatory text, with the modifications clearly indicated, will be made available to the public, for written comment, at least 15 days before it is adopted.

The public may request a copy of the modified regulatory text from the Board's Public Information Office, 1001 "I" Street, Sacramento, CA 95814, (916) 322-2990.

CALIFORNIA AIR RESOURCES BOARD



Catherine Witherspoon  
Executive Officer

Date: October 14, 2003

*The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs see our Web-site at [www.arb.ca.gov](http://www.arb.ca.gov).*



**CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY**  
**AIR RESOURCES BOARD**

**STAFF REPORT: INITIAL STATEMENT OF REASONS**

**PROPOSED AMENDMENTS TO THE VERIFICATION PROCEDURE FOR IN-USE  
STRATEGIES TO CONTROL EMISSIONS FROM DIESEL ENGINES**

Date of Release: October 24, 2003  
Scheduled for Consideration: December 11-12, 2003

This report has been reviewed by the staff of the California Air Resources Board and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Air Resources Board, nor does the mention of trade names or commercial products constitute endorsement or recommendation for use.

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## EXECUTIVE SUMMARY

In 1998, the Air Resources Board (ARB or "Board") identified diesel particulate matter (PM) as a toxic air contaminant. Because of the amount of diesel PM emitted into California's air, it is now by far the number one contributor to the total health risk posed by toxic substances in the ambient air. To address this large-scale health concern, the ARB adopted the Diesel Risk Reduction Plan in 2000. A significant component of the Diesel Risk Reduction Plan involves proposals to apply emission control strategies to in-use diesel vehicles and equipment. To ensure that any technology used toward that end would achieve real and durable emission reductions, staff developed the Diesel Emission Control Strategy Verification Procedure (the "Procedure"), which was adopted by the Board in May 2002.

Since the adoption of the Procedure, staff has identified four primary areas that require amendments:

- (1) Warranty requirements: In developing the warranty requirements for verification, staff tried to strike a balance between the interests of the end-users and the manufacturers of emission control systems. Sometimes, the views of the two groups can seem to be almost diametrically opposed. Nevertheless, staff recognizes that it is imperative that Californians' exposure to diesel particulate matter be reduced to the greatest extent possible, and that a viable warranty is necessary to achieve this goal. Achieving this goal is in jeopardy because the manufacturers of diesel emissions control strategies perceive that the current warranty requirement presents them with too great a liability to participate in the verification process, and end-users perceive it as providing insufficient consumer protection.

Subsequent to the adoption of the Procedure by the Board, manufacturers of diesel emission control strategies began voicing significant concerns to staff regarding the Procedure's warranty requirements. Although manufacturers' concerns over the warranty were lessened by various clarifications made by staff, they were not completely resolved. Full resolution will require that the Board consider amendments to the Procedure. The mandatory warranty for verified diesel emission control systems currently includes coverage of damage to the engine and vehicle or equipment that is proximately caused by the control system. It is primarily the inclusion of the vehicle or equipment in the warranty coverage that has prevented manufacturers of emission control systems from agreeing to participate in the verification process. Their primary concern is the potential for end-users to make spurious claims with the goal of obtaining new vehicles or equipment.

The California Trucking Association (CTA), representing end-users, has repeatedly stated that the duration of warranty coverage is insufficient. Even if coverage of vehicle/equipment damage is removed, staff points out that the warranty affords far more protection than that required under the United States Environmental

Protection Agency's (U.S. EPA) Urban Bus Retrofit/Rebuild program, which was another mandatory emission control effort directed at in-use fleets. As with warranties offered by engine manufacturers, the U.S. EPA's required warranty did not include coverage of vehicle/equipment damage. In addition, it has been staff's experience that the potential for a verified emission control strategy to cause non-engine related damage is minimal. In the unlikely event that such damage should occur, however, all the standard avenues for relief from secondary damages remain intact. Therefore, even without coverage of vehicle/equipment damage, staff does not believe that end-users would be left in an unreasonable situation.

In an effort to achieve the goals of the Diesel Risk Reduction Plan while still maintaining reasonable consumer protection, staff therefore proposes that mandatory warranty coverage extend only to the engine, and not to the vehicle or equipment with which the control system is used.

- (2) Nitrogen dioxide (NO<sub>2</sub>) emission limit: The Procedure states that post-control NO<sub>2</sub> emissions must not exceed 20 percent of the total baseline (pre-control) NO<sub>x</sub> emissions. That NO<sub>2</sub> limit becomes effective on January 1, 2004. Staff proposes that the effective date be changed to January 1, 2007, to provide time to re-evaluate the limit and to allow implementation of effective emission controls to continue in the near-term. Re-evaluation of the limit is advised, as questions have arisen concerning the appropriateness of the limit given new information on the expected fleet penetration of high-NO<sub>2</sub> systems and the nature of NO<sub>2</sub> emissions in general. The delay ends before staff expects large-scale implementation of emission control systems, and therefore prevents negative regional health effects.
- (3) Proposed verification testing protocol: An early step in the verification process that applicants must take is the preparation of the Proposed Verification Testing Protocol. One of the subsections of the proposed protocol requires that the applicant describe its system's principles of operation. Staff must develop a good understanding of the system for several reasons, principal among them being the need to determine whether additional analyses for other harmful pollutants are necessary. Staff proposes adding language to that subsection which clarifies how staff is to handle those control systems that appear to rely on principles not generally understood or accepted by the scientific world. The proposed language gives the applicant two opportunities to demonstrate that its product relies on sound principles of science and engineering to achieve emission reductions. After review of the second submittal, the Executive Officer may determine to either continue the verification process or to suspend the application or revoke an existing verification.
- (4) Harmonization of Durability Requirements: The fourth major proposed amendment is born of an on-going effort to harmonize the Procedure with the U.S. EPA's verification protocol. The Procedure requires that emission reduction testing for a diesel emission control strategy be performed before and after the service accumulation period. As an alternative to testing a single unit in that fashion, staff proposes that the applicant be allowed to request that staff consider the testing of

two identical units, one that has been pre-conditioned and another that has completed the service accumulation period. That testing option is consistent with the requirements in the U.S. EPA's verification protocol.

Additional proposed amendments of a more minor nature include: (1) definitional changes and additions for consistency with the proposed Airborne Toxic Control Measure to Reduce Diesel Particulate Matter Emissions from Stationary Diesel-Fueled Compression Ignition Engines, (2) clarification of test cycle selection for off-road and stationary engine testing, (3) clarification that the Executive Officer will consider test procedures specified in airborne toxic control measures when evaluating a request to use an alternative test cycle or method, and (4) correction of the procedure for measuring NO<sub>2</sub>.

Because no direct emissions benefits are associated with the staff proposal, no traditional cost effectiveness can be calculated. When staff proposes rules to implement in-use controls for the various categories of diesel engines, it will provide more detailed estimates, taking into account the specific issues associated with each category. Staff's proposed amendments do not change the voluntary nature of the Procedure. Accordingly, there will be economic impacts only with those individuals that choose to follow the Procedure to verify their products.

The proposed amendments to the Procedure retain the sound guidelines for evaluation and the flexibility of the original Procedure that are needed to reduce the burden on applicants and allow speedy implementation of the Diesel Risk Reduction Plan. The ARB staff recommends that the Board adopt the proposed amendments to sections of 2700 to 2710, Title 13, California Code of Regulations, set forth in the proposed Regulation Order in Appendix A.

## **1 INTRODUCTION**

This report, written by the staff of the Air Resources Board (ARB or "Board"), describes proposed amendments to the Verification Procedure, Warranty and In-Use Compliance Requirements for In-Use Strategies to Control Emissions from Diesel Engines (the "Procedure"), which is in the California Code of Regulations, Title 13, Sections 2700-2710. The primary purpose of the Procedure is to support California's Diesel Risk Reduction Plan (see Section 2), which aims to dramatically reduce Californians' exposure to diesel particulate matter (PM). Verification under the Procedure is the key to gaining recognition of emissions benefits and thus to participating in the diesel emission control market created by the Diesel Risk Reduction Plan. The Procedure contains emission testing requirements that manufacturers of emission control technologies must fulfill in order for their products to be verified, as well as warranty and in-use compliance testing requirements. Since the Procedure was adopted by the Board in May 2002, staff has determined that changes could be made to improve the Procedure and better enable ARB to meet the goals of the Diesel Risk Reduction Plan. This report describes those changes and the rationale behind them.

Section 2 of the report provides context and historical background on the Procedure. The amendments staff is proposing are briefly summarized in Section 3, and Section 4 discusses the rationale used by staff in arriving at those proposals. Staff discusses how the proposal affects interaction of the Procedure with other ARB diesel programs in Section 5, and describes potential issues of controversy in Section 6. A number of regulatory alternatives to what staff proposes are covered in Section 7. Staff discusses the economic impacts of the proposed amendments on the public and private sectors in Section 8, and environmental impacts in Section 9. After briefly addressing cost-effectiveness in Section 10, staff concludes the report with Section 11.

## **2 BACKGROUND**

In 1998, the ARB identified diesel PM as a toxic air contaminant following a ten-year review process. A toxic air contaminant is an air pollutant that contributes to mortality or serious illness, or poses other potential hazards to human health. Most toxic air contaminants are volatile and are found primarily in the atmosphere as gases, but some are atmospheric particles or liquid droplets. Diesel PM is of particular concern because it can be distributed over large regions, thus creating widespread public exposure.

Because of the amount of diesel PM emitted into California's air, it is by far the number one toxic air contaminant. To address this large-scale health concern, the ARB adopted the Diesel Risk Reduction Plan in 2000 (ARB, 2000). One of the primary goals of the Diesel Risk Reduction Plan is to reduce emissions of diesel PM from the long-lived in-use fleet. The Plan outlines measures that include the use of diesel emission control strategies with existing diesel vehicles and equipment in on-road, off-road, and stationary applications. To be able to implement those measures, ARB must first verify that candidate emission control technologies are effective in reducing emissions.



In response to that requirement, ARB staff developed a procedure to verify strategies that provide real and durable reductions in diesel PM emissions. The Board adopted the Procedure at the public hearing held on May 16, 2002. Although the primary function of the Procedure is to support the Diesel Risk Reduction Plan, it also quantifies NOx reductions in light of California's persistent ozone problem. The Procedure encompasses on-road, off-road, and stationary applications and is designed to evaluate a broad range of technologies, including aftertreatment systems, alternative diesel fuels, and fuel additives. The Procedure represents a cooperative inter-divisional effort that drew upon the expertise of staff in different areas as needed. Staff also worked with and continues to work with the U.S. EPA on harmonizing the verification procedures between the two agencies.

The requirements for verification under the Procedure extend beyond conducting emissions testing to quantify emissions reductions. The Procedure classifies technologies based on their PM reductions as Level 1 (25 percent minimum reduction), Level 2 (50 percent minimum reduction), or Level 3 (85 percent minimum reduction or maximum emission rate of 0.01 grams per brakehorsepower-hour). A technology must achieve at least a Level 1 PM reduction to be verified. To ensure that a product's emission reductions are durable, verification requires that applicants conduct emissions testing after the product has accumulated a specified amount of service in the field or in a laboratory. Applicants must also offer a specified minimum warranty to protect consumers against defects. Last, applicants must both conduct and successfully pass in-use compliance testing for their products to retain their verified status. Thus, the Procedure aims to ensure real and durable emission reductions, acknowledges consumers' interests, and requires that systems sold in the marketplace perform as well as those used for verification testing.

Staff has maintained a dialogue with stakeholders before, during, and after workshops and periods of public comment. As a result of this on-going dialogue, staff determined that changes could be made to improve the Procedure and better enable ARB to meet the Diesel Risk Reduction Plan's goal to dramatically reduce public exposure to diesel particulate matter. The proposed changes are briefly summarized in the next section and discussed in more detail in Section 4.

### **3 SUMMARY OF PROPOSED AMENDMENTS**

The following is a concise summary of staff's proposed amendments to the Diesel Emission Control Strategy Verification Procedure. Section 4 discusses the proposals and explains the rationale behind them.

#### **3.1 Warranty Requirements**

The mandatory warranty for verified diesel emission control systems currently includes coverage of damage to the engine and vehicle or equipment proximately caused by the

control system. Staff proposes that warranty coverage only extend to the engine, and not the vehicle or equipment with which the control system is used.

### **3.2 NO<sub>2</sub> Limit**

The Procedure states that post-control NO<sub>2</sub> emissions must not exceed 20 percent of the total baseline (pre-control) NO<sub>x</sub> emissions on a mass basis. That NO<sub>2</sub> limit becomes effective on January 1, 2004. Staff proposes that the effective date be changed to January 1, 2007.

### **3.3 Proposed Verification Testing Protocol**

Section 2702(b) of the Procedure describes the requirements for the Proposed Verification Testing Protocol that the applicant must prepare. One of the subsections of the proposed protocol requires that the applicant describe its system's principles of operation. Staff proposes adding language to that subsection which relates to those control systems that appear to rely on principles not generally understood or accepted by the scientific world. The proposed language states that it is the responsibility on the applicant to demonstrate that its product relies on sound principles of science and engineering to achieve emission reductions. If, after reviewing the proposed protocol, the Executive Officer determines that the applicant has not made a satisfactory demonstration, staff proposes that the applicant be given a second opportunity (60 days) to submit additional material and clarifications that explain the principles of operation. After review of the second submittal, the Executive Officer may determine to either continue the verification process or to suspend the application. If an application has been suspended, it may only be reactivated at the discretion of the Executive Officer. Staff also proposes that if at any point in the verification process the Executive Officer has reason to doubt the scientific or engineering soundness of a product, the Executive Officer can require the applicant to provide further substantiation or risk suspension of the application or revocation of an existing verification.

In addition to the above, staff proposes adding another section to the proposed protocol in which the applicant simply states that the applicant agrees to provide a warranty pursuant to the requirements in the Procedure.

### **3.4 Harmonization of Durability Requirements**

The Procedure requires that emission reduction testing for a diesel emission control strategy be performed before and after the service accumulation period. As an alternative to testing a single unit in that fashion, staff proposes that the applicant be allowed to request that staff consider the testing of two identical units, one that has been pre-conditioned and another that has completed the service accumulation period. The testing of two such units is consistent with U.S. EPA's verification procedure. In reviewing the request, staff may consider all relevant information, such as:

- The effect of the system on engine operation over time. Systems that cause changes in engine operation are likely not to qualify for this testing option.
- The quality of the evidence the applicant can provide to support that the two units are identical.

- Previous experience with similar or related technologies.
- Whether the applicant is participating in the U.S. EPA verification process and has made an agreement with U.S. EPA to test two units.

### **3.5 Additional Proposed Amendments**

Definitions: Staff added the definitions for the terms “Emergency Use “ and “ALSF-1 and ALSF-2” and modified the definitions of the terms “Emergency Standby Engine,” “Portable Diesel Engine,” and “Stationary Diesel Engine.”

Off-road and Stationary Engine Test Requirements: Staff clarified that the off-road diesel engine regulations referred to in subsections 2703(e)(2) and (3) require the use of a specific test cycle, but that applicants may nevertheless request the Executive Officer to consider alternatives.

Alternative Test Cycles and Methods: Section 2703(f) lists examples of items that the Executive Officer may consider when evaluating an applicant’s request to use an alternative test cycle or method. To that list, staff added test procedures specified in airborne toxic control measures (ATCMs) adopted by the ARB.

Procedure for Measuring NO<sub>2</sub>: Section 2706(a)(3) indicates that part of the NO<sub>2</sub> calculation involves subtracting NO from NO<sub>x</sub> on a second-by-second basis. Staff corrected that procedure by indicating that NO<sub>2</sub> is to be determined by subtracting the average rather than second-by-second values.

Limits on Other Pollutants: Section 2706(b) specifies that verified diesel emission control strategies must not increase the emissions of carbon monoxide (CO) greater than the current CO emission standards for new diesel engines. Staff amended this requirement for stationary engine applications. For stationary applications, the diesel emission control strategy must not result in an increase in the emissions of CO by more than 10 percent above baseline levels.

## **4 DISCUSSION**

This section of the report includes a more detailed discussion of the proposed amendments and the reasoning staff used in their development.

### **4.1 Warranty Requirements**

In developing the warranty requirements for verification, staff has had to strike a balance between the needs of end-users and manufacturers of emission control systems. As can be expected, the views of the two groups are almost diametrically opposed. Nevertheless, staff recognizes that it is imperative that Californians’ exposure to diesel particulate matter be reduced to the greatest extent possible. Achievement of that goal is currently in jeopardy because manufacturers perceive the warranty presents them with too great a liability to participate, and end-users perceive it as providing insufficient consumer protection.

Subsequent to the adoption of the Procedure in May 2002, diesel emission control strategy manufacturers began strongly voicing concerns with the warranty requirements, in particular with the extent of liability. Staff commenced working with manufacturers to clarify the requirements within the scope permitted to 15-day changes. The resulting modifications were released with other modified text in the Notice of Public Availability of Modified Text on January 29, 2003. Although the manufacturers looked favorably upon the clarifications staff was able to make, they continued to express dissatisfaction with the requirement that liability include damages to the vehicle or equipment itself, and not simply the engine. Their primary concern is the potential for end-users to make spurious claims with the goal of obtaining new vehicles or equipment. The perceived financial risk has been significant enough to prevent some manufacturers from accepting the required warranty, and thus from attaining verification. Consequently, the range of verified emission control options available to end-users has been reduced.

The manufacturers' concerns have prompted staff to re-evaluate the merit of including vehicle/equipment damage in the warranty. Staff has therefore sought to (1) get a sense for the likelihood of such damage by reviewing field experience with diesel emission control strategies, and (2) determine the nature of the coverage afforded by other related warranties.

#### 4.1.1 Experience with Failures/Damage in the Field

Staff has been involved with both demonstrations and commercial installations of diesel emission control systems on a variety of vehicles including school buses, solid waste collection vehicles, transit buses, long-haul trucks, and construction equipment. The majority of that experience has been with passive diesel particulate filters (DPFs) used in both verified and unverified applications. Although failures of verified systems in verified applications have been minimal, staff will not acknowledge the successes here. Instead, staff now emphasizes instances of failure and damage for verified as well as unverified systems:

- In January 2003, staff visited personnel of the City of Los Angeles in the Fleet Services division to get an update on their experiences with the over 300 solid waste collection vehicles that had been retrofitted with DPFs. They reported no engine or vehicle damage caused by the verified DPFs. Their own shop performed a couple of welds to repair cracks in two filter housings, but the overall experience has been positive. Los Angeles City Bureau of Sanitation staff has expressed satisfaction with current trends and the use of retrofits on their equipment. The sanitation trucks have logged 965,715 miles on DPF units with only a few minor problems. City of Los Angeles Bureau of Sanitation Services management said they will purchase more when funds are available.

In an experimental demonstration project, four sanitation trucks were retrofitted with unverified systems that included an exhaust gas recirculation (EGR) system and a DPF. Two of the engines sustained damage and had to be replaced. One engine

sustained heat damage because the EGR system was incorrectly calibrated. The manufacturer of the unverified system paid for a replacement engine. The second engine was damaged because the wrong filter type was installed. The filter came loose and vibrations caused it to deteriorate. It shed small fragments of substrate which were directed back into the engine via the EGR component. That engine was also replaced by the system manufacturer. Those two instances are the worst retrofit-caused damage that staff has encountered to date. Had either of the two situations occurred with verified systems, the engine damage would have been completely covered by the warranty. The proposed amendment does not remove coverage of engine damage. It is noted in passing that when correctly calibrated and installed, that same EGR/DPF system has proven to be safe and effective in numerous transit bus applications.

- In the latter half of 2002, a private trucking fleet retrofitted over 100 of its long-haul trucks with verified DPFs. The company updated staff in early October 2003 on its experiences to date. The main problems encountered have been as follows: brackets did not fit properly and required reworking, backpressure sensor lines failed and required replacement, a number of DPF can components experienced failures due to a design flaw, and there has been difficulty in obtaining spare parts. The company is currently in the process of determining the exact extent of these issues. It reported no filter damage, and no engine or vehicle damage.
- Part of the South Coast Air Quality Management District's school bus demonstration program included the retrofit of buses powered by 1978 two-stroke engines (an unverified application) with DPFs. The worst failure that occurred was when one of the buses stalled because the filter plugged up and had to be towed. Nevertheless, there was subsequently no indication of engine or vehicle damage.
- One of the Los Angeles Metropolitan Transit Authority buses equipped with a DPF experienced a complete failure attributed to a bracket that came loose. The filter apparently rattled back and forth causing the substrate to gradually erode. By the time the problem was discovered, the substrate had been reduced to the size of a softball. Staff investigating the failure did not observe any engine or vehicle damage based on a visual examination of the bus and a review of data from subsequent emissions testing.
- ARB has been participating in an experimental demonstration program with the Construction Industry Air Quality Coalition (CIAQC) in which off-road construction equipment was retrofitted with DPFs (another unverified application). The program seeks to develop experience with retrofits in off-road applications, which are often extremely demanding physically. On-going reports from the field by the company Booz Allen Hamilton have described all failures and problems in detail. One of the most demanding pieces of equipment retrofitted with a DPF was a treaded bulldozer. Its extreme vibrations and lack of convenient location for installation of the DPF created problems for the DPF and the exhaust piping leading to it. In addition to the filter substrate itself sustaining damage, a tear developed in the exhaust piping just

downstream from the weld to the main exhaust manifold. Aside from that tear, no damage to the equipment was reported. Also, there has been no indication of any engine damage. Had the bulldozer installation been intended to support a verification, that DPF would not have been verified for that application.

The control strategies thus far encountered appear to have an extremely low probability for causing damage to vehicles and equipment. The Manufacturers of Emission Controls Association (MECA) strongly agrees with that observation. They tend to be more intimately involved with the engine and its operation than with other vehicle/equipment parts. Therefore, if some potential exists for damage to a significant component, it would most likely be the engine. Even so, the probability of a verified control strategy causing engine damage when used in an appropriate fashion is extremely low. Staff has not yet encountered any such cases. All instances of failure and damage mentioned above for verified systems would be covered by the proposed warranty.

#### 4.1.2 Coverage in Related Warranties

The most similar program to ARB's in-use diesel emission control program is the U.S. EPA Urban Bus Retrofit/Rebuild Program, which was another mandatory emission control effort directed at in-use fleets. The program required a 100,000-mile defect warranty and 150,000-mile performance warranty (ARB requires 150,000 for both). However, manufacturers were not required to offer warranties that cover damages to the engine or vehicle caused by emission control systems. In addition, no durability demonstration was required by U.S. EPA. In the program's development phase, the warranty was a point of contention, as it is presently, but there were never any requirements written into the rule for secondary damages.

Besides investigating the U.S. EPA program's requirements, staff also reviewed warranty statements from various engine manufacturers and spoke directly with representatives from several of the larger companies. Engine warranties do not state that they cover damage to other vehicle components. They cover only the engines themselves.

Given staff's findings, it appears that explicit inclusion of damage to the engine and vehicle/equipment in a warranty is unprecedented.

#### 4.1.3 Staff's Proposal

Although the potential for damage to vehicles/equipment does not appear to be significant, and related warranties do not afford the same level of consumer protection against secondary damages, owners may naturally be concerned should coverage of vehicle/equipment damage be removed from the warranty. First, it should be noted that the warranty required by ARB is the minimum required by law. Manufacturers may wish to offer enhanced warranties to make their products more attractive to potential customers. Some have already expressed that is their intent. More importantly, staff does not believe that removal of such coverage would place owners in an unreasonable situation. In the unlikely event that an owner's vehicle or equipment sustains damage

as a result of the malfunction of a verified diesel emission control strategy, the standard avenues of relief are available. Legal theories of negligence and product liability would provide the owner potential relief. The comprehensive coverage in the owner's vehicle insurance policy would be available to cover damage. Furthermore, business losses attributable to the damage may be covered under the vehicle owner's business interruption insurance.

Active participation of manufacturers is critical to achieving the health benefits called for by the DRRP. Because the potential for a verified control strategy to cause non-engine related damage is minimal, no related warranties afford the same level of coverage of secondary damages, and owners have all of the standard avenues to pursue for relief should such damage occur, staff proposes that the warranty required by ARB not include liability for damage caused to the vehicle or equipment with which a strategy is used.

## 4.2 NO<sub>2</sub> Limit

Another proposed amendment relates to the nitrogen dioxide (NO<sub>2</sub>) emission limit. The Procedure currently requires that the emissions of NO<sub>2</sub> from an engine employing a diesel emission control strategy not exceed 20 percent of the baseline (engine-out) NO<sub>x</sub> emissions beginning on January 1, 2004. As of that date, no application for verification will be approved if the strategy does not meet the limit. In addition, previously verified strategies that do not meet the limit will no longer be considered verified for the purposes of new applications or new installations. Existing installations of such verified strategies, however, do not need to be removed and will continue to be recognized as verified by ARB. The diesel emission control strategies most directly affected by the NO<sub>2</sub> emission limit are those that oxidize nitric oxide (NO) in the exhaust to NO<sub>2</sub> which assists with the oxidation of PM (e.g., some passive diesel particulate filters). Such strategies have been shown to emit oxides of nitrogen (NO<sub>x</sub>) that have a significantly higher fraction of NO<sub>2</sub> than was originally present in the engine's exhaust.

As described in the Procedure's Initial Statement of Reasons (ISOR) released on March 29, 2002, ARB conducted atmospheric modeling for the year 2010 with various NO<sub>2</sub> fractions to investigate the effects of large-scale implementation of high-NO<sub>2</sub> strategies (ARB, 2002). The two basic assumptions that went into the modeling were that (1) 90 percent of all diesels were equipped with high-NO<sub>2</sub> diesel particulate filters, and (2) baseline NO<sub>2</sub> emissions were equivalent to 10 percent of the total NO<sub>x</sub> emissions. After reviewing the results of the modeling and presenting them before the International Diesel Retrofit Advisory Committee (February 6, 2002), staff determined that an NO<sub>2</sub> emission limit of 20 percent of the total baseline NO<sub>x</sub> emissions (by mass) would both minimize potential negative side effects (such as increases in ozone exposure) and potentially leave the door open for effective strategies that rely on the NO<sub>2</sub> oxidation mechanism. To give manufacturers time to redesign their control strategies to meet the limit, the Board approved an effective date of January 1, 2004.

Subsequent to the adoption of the Procedure, staff received several comments from manufacturers which, for the most part, did not support the NO<sub>2</sub> limit. Each comment is discussed in turn, below.

#### 4.2.1 Variability of Engine-out and DPF-out NO<sub>2</sub> Emissions

One issue raised by manufacturers is that the variability of engine-out NO<sub>2</sub> will reduce the ability of verifications to cover a range of engine families, thus dramatically increasing the cost of verification.

That comment has merit for the following reasons. Systems are verified on the basis of groups of engines and applications that are defined by parameters relevant to the system being verified (emission control groups). If a passive DPF is shown to work on a truck with an engine certified to a particular PM emission standard, it can be verified for similar engines that meet the same standard. If testing shows that a DPF meets the NO<sub>2</sub> limit on a particular engine, staff has no certification standard or database of NO<sub>2</sub> emission data for reference to assist in determining other engines for which the DPF can be verified.

Without taking NO<sub>2</sub> into account, the emission control group for which passive DPFs are currently verified is large and well-defined (nearly all 1994-2002 on-road engines). The same cannot be said when NO<sub>2</sub> enters the picture. All of the vehicles in the EC-Diesel Technology Validation Program were in that same emission control group (LeTavec, 2000). Figures 1 and 2 show NO<sub>2</sub> fractions<sup>1</sup> for vehicles in the program equipped with one of the verified DPFs. The data is sorted by test cycle in Figure 1 and by engine series in Figure 2. In each case, a wide spectrum of NO<sub>2</sub> fractions is observed, often ranging 30 to 40 percentage points for each subgroup. Such a spread is large given that the limit is set at 20 percent. The data suggests that both test cycle and engine-type can have a significant impact on the NO<sub>2</sub> fraction. That observation is especially significant given that (1) all of the engines tested were from the same emission control group, and (2) baseline testing of other vehicles in the same fleets with the same engines showed a low engine-out NO<sub>2</sub> fraction with little absolute variation ( $5.0 \pm 0.8$  percent<sup>2</sup>). The implication is that the 1994-2002 on-road group may need to be further subdivided in some fashion, but there is no clear indication as to what parameters should be used to do so. Such a subdivision could make verification much more burdensome for the applicant as it attempts to determine with which groups of engines its product will meet the NO<sub>2</sub> limit.

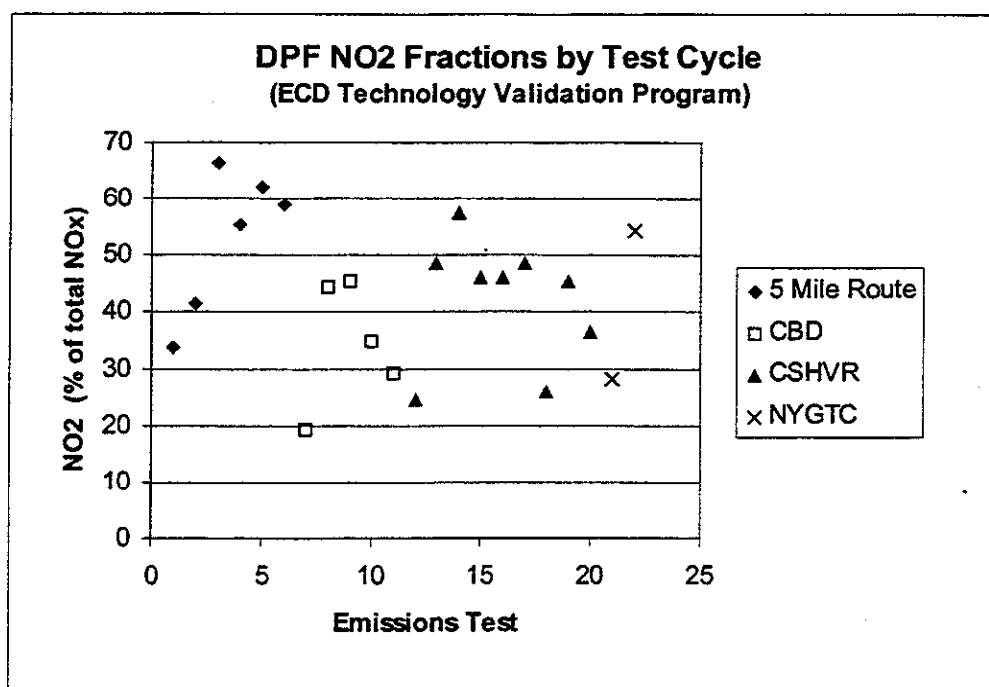
#### 4.2.2 Engines With NO<sub>2</sub> in Excess of 20% of NO<sub>x</sub>

Another comment received by staff stated that there are engines in California with engine-out NO<sub>2</sub> levels in excess of 20 percent. Although most of the limited data collected by staff indicates that 5 percent NO<sub>2</sub> is more typical, there are data that support the comment. One manufacturer has submitted data indicating that a 1999

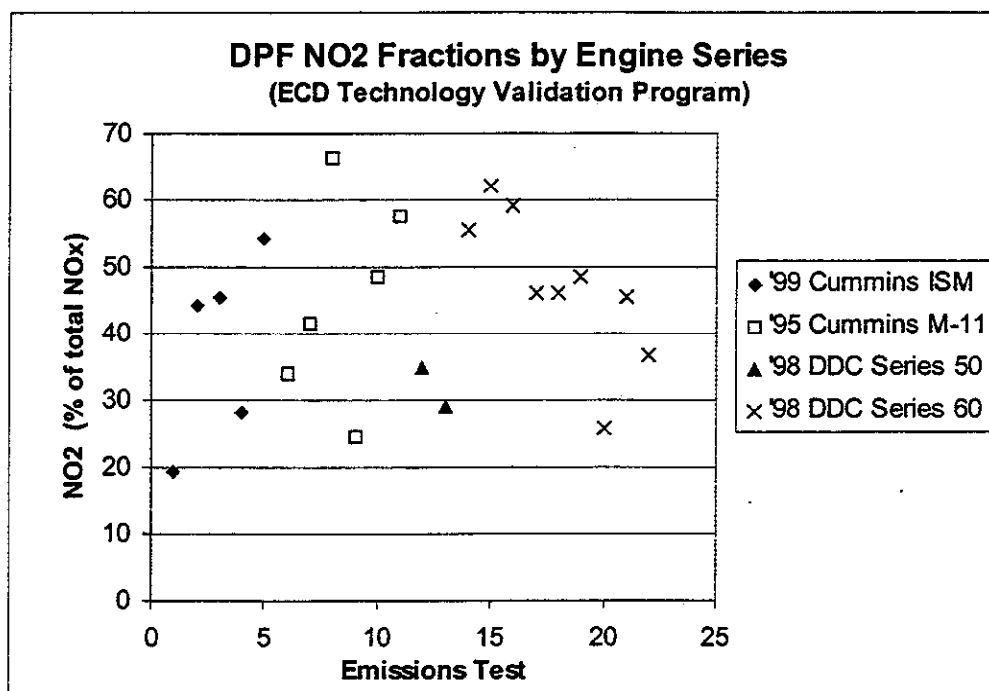
<sup>1</sup> NO<sub>2</sub> fractions were calculated by staff using NO and NO<sub>x</sub> emissions data from the ECD Technology Validation Program's Master Spreadsheet (Vertin, 2002).

<sup>2</sup> Based on data from (Vertin, 2002), as above. This result is for a 95 percent confidence interval and excludes three instances where staff found negative NO<sub>2</sub> fractions.





**Figure 1.** Note that CBD = Central Business District, CSHVR = City Suburban Heavy Vehicle Route, and NYGTC = New York Garbage Truck Cycle.



**Figure 2.**

Navistar 7.3-liter engine has a baseline NO<sub>2</sub> fraction of about 21 percent as measured over the heavy-duty transient Federal Test Procedure (FTP). Another manufacturer submitted data for a 1990 Navistar DT-466 using the same test procedure which indicate an 18 percent NO<sub>2</sub> fraction. Such engines would allow little to no increase in NO<sub>2</sub> emissions. Following the letter of the Procedure would prohibit retrofit of some high-NO<sub>2</sub> engines unless a control strategy actually reduced the engine-out NO<sub>2</sub> fraction.

#### 4.2.3 Lead Time for Product Development

Several companies opposed the January 1, 2004, effective date on the grounds that it will not provide adequate time for development of compliant products. Although not yet verified, there are a number of commercially-available passive DPFs that comply with the NO<sub>2</sub> limit, but they use less active catalysts. As a result, they have significantly higher exhaust temperature requirements and therefore are compatible with a more restricted range of applications. Staff is aware of some progress being made with lowering NO<sub>2</sub> emissions from passive filters with a greater range of applicability, but to date, there are no verified Level 3 diesel emission control strategies that meet the NO<sub>2</sub> limit. Therefore, unless new compliant systems are verified soon, California stands to lose valuable early field experience and PM reductions that can be gained prior to the implementation of fleet rules.

#### 4.2.4 Atmospheric Modeling Uncertainties

At the present time, diesel engine NO<sub>2</sub> emissions have not been adequately characterized. Historically, NO<sub>2</sub> has never been measured during diesel engine emissions testing. ARB's atmospheric modeling assumed an average engine-out NO<sub>2</sub> fraction of 10 percent, which is the conventional fraction used when modeling NO<sub>x</sub> emissions from combustion sources in general. The accuracy of that assumption for diesel engines specifically is not well established. As already discussed, the limited data staff has collected indicate that the NO<sub>2</sub> fraction may vary substantially from one engine to another. The extent to which that variability is due to different test cycles or test conditions is not known at this time.

In addition to the uncertainty surrounding baseline NO<sub>2</sub> emissions, there are also questions concerning the modeling assumption that 90 percent of all diesels will be equipped with high-NO<sub>2</sub> diesel particulate filters by 2010. To date, passive DPFs are only verified for 1994-2002 on-road engines that meet certain exhaust temperature requirements. Exhaust temperature data from various solid waste collection vehicles indicates that only about one third of such vehicles with 1994-2002 engines would meet the temperature requirements of the currently-verified passive DPFs (ARB, 2003). Because passive DPFs are limited in their application to engines that are not too dirty or too cold, 90 percent penetration into the entire diesel fleet appears to be unrealistic.

In order to determine the significance of a more realistic fleet penetration scenario, ARB has initiated another atmospheric modeling effort using a new scenario. The new scenario acknowledges the limited application of passive DPFs and introduces a mix of retrofit technologies as well as the option of repowering with cleaner engines. The goal

of the new modeling effort is to determine what an appropriate NO<sub>2</sub> limit might be in light of the more realistic scenario. At the present time, staff has not yet completed this study.

#### 4.2.5 Staff's Proposal

In order to more meaningfully and realistically evaluate diesel emission control strategies that increase NO<sub>2</sub> emissions, the questions raised above need to be resolved. Staff therefore proposes that the effective date for the NO<sub>2</sub> limit be delayed. The duration of the delay must be long enough to give staff the time it needs to gather additional data and develop a better understanding of the NO<sub>2</sub> issue, and yet not so long as to have significant penetration of high-NO<sub>2</sub> strategies into the fleet.

Based on a draft implementation schedule for fleet rules, staff estimates that only 2 percent of the diesel fleet (sum of on- and off-road) will be required to use Best Available Control Technology (BACT) by the end of 2006. By the end of 2007, staff estimates that percentage to increase to about 8 percent (22 percent of the on-road fleet) if, as staff expects, off-road implementation has not yet begun. Compared to the 90 percent penetration of high-NO<sub>2</sub> strategies used in the modeling, the 2 and 8 percent estimates do not seem significant, especially since BACT is certainly not limited to technologies with high NO<sub>2</sub> emissions<sup>3</sup>. Nevertheless, staff opts for a conservative stance and recommends that a proposed delay not extend beyond the end of 2006 (a three year delay). Staff's conservative position is reasonable because the early, voluntary retrofit activity taking place in California may result in more than 2 percent implementation by the end of 2006. The new modeling effort now underway, in fact, will examine the effects of the delay using a scenario with more widespread implementation.

Besides additional atmospheric modeling, the delay will afford staff more time to gather NO<sub>2</sub> emissions data that will be necessary to address the issues raised above. Staff will obtain data from ARB's Heavy-Duty Emissions Test Laboratory, applications submitted for verification, and from demonstration projects and studies around the world. The additional atmospheric modeling and emissions data will be necessary to determine if a different NO<sub>2</sub> limit is appropriate, and more generally if a simple limit is the appropriate way to address NO<sub>2</sub> concerns.

The proposed delay will be welcomed by many manufacturers of emission control systems. In response to a request for comments issued in September 2003 which asked for input on the NO<sub>2</sub> issue in general, the Manufacturers of Emission Controls Association (MECA) indicated that it supports delaying the effective date and looks forward to working with staff to resolve the complex issues posed by controlling NO<sub>2</sub> emissions. The delay will also give manufacturers more time for product development aimed at reducing NO<sub>2</sub> emissions. As mentioned earlier, staff is aware of some

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<sup>3</sup> Active DPFs and repowering with 2007 engines, for example, are NO<sub>2</sub>-compliant alternatives that achieve Level 3 PM reductions. Although 2007 engines may have high NO<sub>2</sub> fractions, they will likely emit less NO<sub>2</sub> than older engines because of their much lower overall NO<sub>x</sub> emissions. Level 3 applies to strategies that reduce PM by 85 percent or more, or to less than 0.01 grams per brake-horsepower hour.

progress being made with lowering NO<sub>2</sub> emissions from passive filters. Continued development requires time and money. The delay will provide additional time as well as additional opportunities to generate the revenue needed for development from the sale of current designs.

In 2002, ARB considered and adopted a reasonable yet protective NO<sub>2</sub> standard. New information and unanswered questions indicate that there is potential for that to change. In order to balance concerns over the health effects of higher NO<sub>2</sub> emissions and unmitigated PM emissions, staff proposes that the effective date of the NO<sub>2</sub> emission limit be delayed by three years to January 1, 2007.

#### **4.3 Proposed Verification Testing Protocol**

The first step in the verification process that an applicant takes is preparation of the Proposed Verification Testing Protocol, described in Section 2702(b) of the Procedure. The purpose of requiring the proposed protocol is to give staff the opportunity to understand the nature of the product under consideration, to determine the need for additional analyses, and to ensure that the planned testing is in accordance with the requirements for verification.

There are several reasons why it is critical for staff to develop a good understanding of how an emission control system works. The Procedure is intended to be sufficiently flexible and comprehensive to evaluate all kinds of diesel emission control strategies, whether they use aftertreatment hardware, an alternative diesel fuel, or some other method of reducing emissions. In order to determine which parts of the Procedure apply to a given product, staff must understand the product. That is especially true when applicants request alternatives to required test methods. A key determination that staff must make is whether additional analyses for other harmful pollutants are necessary. That determination, and the public health protection which motivates it, utterly depend on staff developing a good comprehension of the product. Another task that staff must perform which hinges on a good understanding is the determination of the limits of a product's applicability. If staff knows how a product works, it can reasonably estimate the breadth of engines and applications for which verification is merited based on a given set of emissions test data. Without understanding the principles of operation, staff may need to see data for each and every engine for which the applicant seeks verification. That situation would make verification extremely cost prohibitive. It is therefore in the best interests of the applicants as well as the public that staff gains the understanding it needs.

For the reasons noted above, one of the subsections of the proposed protocol requires that the applicant describe its system's principles of operation. The existing language is sufficient for handling technologies, such as diesel particulate filters, that function via processes that are generally understood. If, however, an applicant describes principles of operation that do not appear to be generally understood or accepted by the scientific world, the existing language does not provide clear guidance on how staff is to proceed. Section 2700 indicates that the Procedure applies to in-use strategies that are able to control emissions through the use of sound principles of science and engineering, but

does not provide any process for handling cases that do not at first appear to meet that criterion.

To fill that need, staff proposes adding language to subsection 2702(b). The proposed language states that it is the responsibility of the applicant to demonstrate that its product relies on sound principles of science and engineering to achieve emission reductions. That statement will help to ensure that applicants realize it is not staff's responsibility to demonstrate the soundness of their products, but rather their own. The applicant must perform any research necessary to substantiate a novel or unique approach to reducing emissions.

If, after reviewing the proposed protocol, the Executive Officer determines that the applicant has not made a satisfactory demonstration of the soundness of its product, staff proposes that the applicant be given a second opportunity (60 days) to submit additional material and clarifications that explain the principles of operation. Based on past experience, applicants may need feedback from staff in order to understand what a satisfactory demonstration entails. Thus, a second opportunity for explanation is proposed. Staff includes a time limit of 60 days to prevent an endless exchange of informal questions and answers via telephone and email with applicants that are not actually prepared for verification.

After review of the second submittal, the Executive Officer may determine to either continue the verification process or to suspend the application. Because of limited staff resources, staff proposes that applicants be limited to two formal attempts to explain their products. If an application has been suspended, it may only be reactivated at the discretion of the Executive Officer. In that manner, applicants with suspended applications may still have an opportunity to have their products verified, but ARB is not obligated to expend additional resources reviewing those applications.

Staff also proposes that if at any point in the verification process the Executive Officer has reason to doubt the scientific or engineering soundness of a product, the Executive Officer can require the applicant to provide further substantiation or risk suspension of the application. It is possible that a product may at first appear sound based on review of the proposed verification testing protocol, but that subsequent information could suggest otherwise. If, for instance, staff conducts its own emission testing using an applicant's product and finds inconsistent results, staff may require that the applicant explain the situation and potentially modify the product to correct a problem.

In addition to the above, staff proposes adding another section to the proposed protocol in which the applicant simply states that the applicant agrees to provide a warranty pursuant to the requirements in the Procedure. Based on past experience, staff finds that it is important for the applicant to be aware of the warranty requirements and the potential costs thereof early on in the verification process.

#### **4.4 Harmonization of Durability Requirements**

The final major proposed amendment relates to durability requirements and is born of an effort to harmonize with U.S. EPA's verification protocol. The Procedure currently requires that emission reduction testing for a diesel emission control strategy be performed before and after the service accumulation period. Although it does not explicitly state that the testing must be performed on the same unit before and after, that was the intention. The verification protocol used to support U.S. EPA's Voluntary Diesel Retrofit Program, however, calls for testing of both a pre-conditioned (or "de-greened") unit and an aged unit at the same point in time, with testing of a single unit at two different times (before and after service accumulation) left as an option.

Although ARB and U.S. EPA's diesel programs are different, staff nevertheless recognizes the value of harmonizing the verification requirements to the greatest extent possible. Staff therefore proposes amending the Procedure to explicitly allow applicants to request that the Executive Officer consider having the durability testing requirement fulfilled via testing two identical units at the same time, one pre-conditioned and one aged. This testing option is limited to those control strategies that have no significant effect on the engine over time. If there is reason to suspect that a strategy may have engine effects, testing before and after the service accumulation on the same engine with a single unit would likely be required. Because of the importance of establishing a system's performance when pre-conditioned, staff will pay close attention to an applicant's request to use the two-unit option. In particular, staff will examine the quality of the evidence that the applicant provides to support that the two units are identical. If the applicant is in the U.S. EPA verification process and has reached an agreement with U.S. EPA to use two units, staff will also take that into consideration.

Both the U.S. EPA and ARB are engaged in an on-going effort to harmonize their respective verification requirements. The proposed modification is one more step in that direction.

#### **4.5 Additional Proposed Amendments**

**Definitions:** Staff added the definitions for the terms "Emergency Use " and "ALSF-1 and ALSF-2" and modified the definitions of the terms "Emergency Standby Engine," "Portable Diesel Engine," and "Stationary Diesel Engine" to make them consistent with the corresponding definitions for those terms in the proposed Airborne Toxic Control Measure to Reduce Diesel Particulate Matter Emissions from Stationary Diesel-Fueled Compression Ignition Engines (stationary ATCM). While the proposed stationary ATCM does not require the use of verified systems, ARB staff anticipates that in some cases owners of stationary diesel engines will use verified technology to comply with the emission limits defined in the proposed ATCM. To avoid potential uncertainty regarding the applicability of the verification emission test results in meeting the proposed stationary ATCM's emission limits, ARB staff believes it is important that the definitions in the Procedure be consistent with the definitions in the proposed ATCM.

**Off-road and Stationary Engine Test Requirements:** To verify a diesel emission control strategy for use with off-road and stationary engines, applicants must follow the test

procedure defined in ARB off-road diesel engine regulations. The original language in subsections 2703(e)(2) and (3) incorrectly implied that the off-road regulations had a number of different test cycles from which applicants could select the most appropriate one. Staff clarified that the regulations require the use of a specific test cycle, but that applicants may nevertheless request the Executive Officer to consider alternatives.

Alternative Test Cycles and Methods: Section 2703(f) lists examples of items that the Executive Officer may consider when evaluating an applicant's request to use an alternative test cycle or method. To that list, staff added test procedures specified in airborne toxic control measures (ATCMs) adopted by the ARB. With that modification, applicants are alerted to the fact that ATCMs may specify test procedures that differ from those in the Procedure, but that those test procedures may be used towards verification with approval from the Executive Officer.

Procedure for Measuring NO<sub>2</sub>: Section 2706(a)(3) indicates that part of the NO<sub>2</sub> calculation involves subtracting NO from NO<sub>x</sub> on a second-by-second basis. While that method is useful for observing how NO<sub>2</sub> emissions vary over time and in different modes of operation within a test cycle, it is not the preferred method for determining the average NO<sub>2</sub> over the cycle. For cycle-average NO<sub>2</sub>, it is more accurate to simply subtract the cycle-average value of NO from that for NO<sub>x</sub>, as is done by all of the laboratories staff has dealt with. Staff therefore proposes that the Procedure be modified accordingly.

Limits on Other Pollutants: Section 2706(b) specifies that verified diesel emission control strategies must not increase the emissions of CO greater than the current CO emission standards for new diesel engines. Staff proposes amending this requirement for stationary engine applications to make it consistent with the requirements of the proposed ATCM for stationary diesel-fueled compression-ignition (CI) engines. The amended language requires diesel emission control strategies for stationary applications to not increase the emissions of CO by more than 10 percent above baseline levels. Staff believes this is appropriate for stationary engine applications because many of the existing stationary engines currently operating in California are not certified to off-road CI engine standards. As such, staff believes requiring verified diesel emission control technologies to reduce CO emission rates to that of a new off-road certified engine may be overly burdensome and beyond the primary goal of the verification process, which is to verify reductions in diesel PM and NO<sub>x</sub>.

## 5 INTERACTION WITH OTHER ARB DIESEL PROGRAMS

The proposed amendments do not affect the basic interaction of the Procedure with other ARB diesel programs. Two items are worth noting, however. First, some of the proposed amendments help to align the Procedure with ATCMs. Staff proposes including consistent definitions and listing ATCM test procedures for consideration as alternative test methods to help the Procedure achieve smoother integration with ATCMs. Second, the proposed delay of the NO<sub>2</sub> limit's effective date extends the

amount of time that various verified diesel emission controls will be eligible to participate with various retrofit programs. Thus, PM reductions may continue to be realized even before most of the fleet rules are implemented.

## **6 ISSUES OF CONTROVERSY**

### **6.1 Warranty**

Staff expects most of the controversy to center around the proposed amendment to the warranty requirements. At the May 16, 2002 public hearing, the California Trucking Association (CTA) commented that the warranty periods were too short and therefore did not protect the consumer. CTA raised warranty issues again at the September 25, 2003 public hearing to consider the fleet rule for solid waste collection vehicles. In response to the September 2003 request for comments, CTA voiced its opposition to the proposed warranty change. Similarly, the California Independent Oil Marketers Association indicated that it insists there be full warranty protection for engines and vehicles. Obviously, any change to the warranty which appears to reduce consumer protection is of great concern to the eventual end-users of the emissions control strategies.

As discussed earlier in Section 4.1, staff's experience with systems in the field indicates that the potential for a verified control strategy to cause non-engine related damage is minimal. Despite this, the potential for even a single "deep-pockets" pay-out has the manufacturers of various proven emissions control systems contemplating withdrawing from active involvement in the Diesel Risk Reduction Plan. Staff believes modification of the warranty is necessary to ensure that their involvement will continue.

It should be pointed out that in the unlikely event that an owner's vehicle or equipment sustains damage as a result of the malfunction of a verified diesel emission control strategy, the standard avenues of relief are available. These include the legal theories of negligence and products liability as well as coverage by vehicular and business interruption insurance policies. Staff does not believe, therefore, that the proposed amendment would place owners in an unreasonable situation.

When the warranty ARB requires is compared against other relevant warranties, even with the proposed change, one finds that the coverage affords greater consumer protection. The warranty required in the U.S. EPA Urban Bus Retrofit/Rebuild Program consisted of a 100,000-mile defect warranty and 150,000-mile performance warranty (ARB requires 150,000 for both). However, manufacturers were not required to offer warranties that cover damages to the engine or vehicle caused by emission control systems. Engine warranties do not state that they cover damage to other vehicle components either. They cover only the engines themselves. For these reasons, staff again states that the end-user would not be placed in an unreasonable situation as a result of removing coverage of vehicle/equipment damage from the warranty.



Motivated by discussions at ARB's public hearing in September, staff has surveyed major diesel emission control system manufacturers to inquire about the availability of extended warranties. The survey revealed that none are currently offering extended warranties on their emission control systems, although one indicated it definitely will do so in the near future. The main reason for the unavailability of extended warranties is the uncertainty surrounding the current warranty required by the Procedure. The uncertainty stems from the fact that the manufacturers have recently been verified or are in the verification process, and so the ramifications of the required warranty are not yet known. Most companies want to reevaluate the situation once the verification program has matured further so that they can determine whether the required warranty is sufficient or if extended warranties should be made available. One company has indicated that it may offer extended warranties for large fleets in the future. The company that indicated it definitely will offer extended warranties said it plans to offer a variety of warranties to solid waste collection vehicle fleets in the near-term, as well as full maintenance leases and preventative maintenance contracts.

## **6.2 NO<sub>2</sub> Limit**

Although many manufacturers of emission control systems support delaying the effective date of the NO<sub>2</sub> limit, other parties, including some manufacturers, have submitted comments indicating their support for not changing the date. While it is encouraging that some manufacturers have confidence in their ability to provide NO<sub>2</sub>-compliant products, those manufacturers' products have not yet been verified. None of the currently-verified Level 3 emission control systems can meet the NO<sub>2</sub> limit.

The imminent effective date of the NO<sub>2</sub> limit, unless changed, stands to eliminate a significant amount of near-term PM emission reductions and invaluable early field experience with retrofits. In addition, as described in Section 4.2, there are significant questions that staff must address concerning how to meaningfully and realistically evaluate emission control strategies that increase NO<sub>2</sub> emissions. Staff therefore holds to its proposal to delay the effective date by three years to allow for more time to resolve those issues.

## **7 REGULATORY ALTERNATIVES**

While developing the proposal, staff considered a number of regulatory alternatives described below.

### **7.1 N Change to Warranty**

If staff elected to retain the coverage of damage to the vehicle or equipment in the warranty, it is likely that many manufacturers of diesel emission control systems would reduce or cease their participation in California's retrofit market. Large and small manufacturers alike have expressed that inclusion of such damages makes the liability too large to risk participation. If manufacturers turn their attention only towards other states and to the original equipment market, California stands to lose enormous benefits associated with reduced diesel PM emissions from the in-use fleet. Therefore, while not

changing the warranty would likely be supported by fleet owners, it is not in the best interest of Californians in general.

## **7.2 No Change to Effective Date of NO<sub>2</sub> Limit**

Retaining the January 1, 2004, effective date for the NO<sub>2</sub> limit is the most conservative way to address concerns over elevated NO<sub>2</sub> emissions from certain emission control systems. Unfortunately, doing so would significantly reduce near-term diesel PM emission reductions that are being achieved by numerous publicly-funded retrofit programs. It would also greatly diminish the invaluable field experience that these technologies are gaining. That experience will play a vital role in the success of future fleet rules. As discussed in Section 4.2, there are significant questions concerning the appropriateness of the current form of the limit and the assumptions that led to its determination. Finally, the proposed delay does not afford high-NO<sub>2</sub> systems enough time to achieve large-scale penetration, and thus prevents negative regional health effects.

## **8 ECONOMIC IMPACTS**

The proposed amendments to the Procedure modify a protocol for evaluation of in-use diesel emission control technologies. Participation in the Diesel Emission Control Strategy Verification program is purely voluntary and a business would presumably use the Procedure only if it believed doing so was financially advantageous. The proposed amendments in no way change the voluntary nature of the Procedure. They do, however, further harmonize the Procedure with that of the U.S. EPA and potentially reduce the financial burden on applicants.

### **8.1 Legal Requirement**

Section 11346.3 of the Government Code requires State agencies to assess the potential for adverse economic impacts on California business enterprises and individuals when proposing to adopt or amend any administrative regulation. The assessment shall include a consideration of the impact of the proposed regulation on California jobs, business expansion, elimination or creation, and the ability of California business to compete with business in other states.

State agencies are also required to estimate the cost or savings to any State or local agency and school district in accordance with instructions adopted by the Department of Finance. The estimate shall include any non-discretionary cost or saving to the local agencies and the cost or saving in federal funding to the State.

### **8.2 Affected Businesses**

Participation in California's diesel emission control program is not mandatory. However, any business or individual that chooses to participate in the program will have to satisfy the requirements of the Procedure. Businesses that choose to participate and thus follow the Procedure include manufacturers and marketers of diesel emission control

technologies. Also, some businesses may be indirectly affected, such as suppliers of raw materials or equipment to participants.

### **8.3 Potential Impact on California Businesses**

The requirements for verification under the Procedure apply to any business that wishes to sell its products in California, regardless of its location. The proposed amendments do not alter that universality. Should any manufacturer or marketer elect to participate in the verification program, it would need to provide detailed information and data on the product in accordance with the Procedure. The testing required by the Procedure may require significant expenditures of capital on the part of a company. The proposed amendments to the Procedure will either cause no change in the cost of testing or potentially reduce the cost if an applicant is approved to use the proposed two-unit durability testing option.

Should a business choose not to participate in the verification program, there are other avenues by which its products may be sold in California. A business having a Vehicle Code 27156 exemption can legally sell the product in California, but can claim no emissions reductions. The product would not be a verified diesel emission control strategy, and would not satisfy the requirements of the fleet rules.

### **8.4 Potential Impact on Employment**

The proposed amendments to the Procedure are not expected to cause a noticeable change in California employment and payroll. Participation in the program is voluntary and presumably only businesses able to afford the program will participate.

### **8.5 Potential Impact of Business Creation, Elimination or Expansion**

The proposed amendments to the Procedure will not impact the status of California business in a noticeably different way from the original version of the Procedure, aside from extending the period of time that products with NO<sub>2</sub> fractions above the limit can be sold.

### **8.6 Potential Impact on Business Competitiveness**

The proposed amendments to the Procedure would have no significant impact on the ability of California's businesses to compete with businesses in other states. Staff's proposals do not change the voluntary nature of the Procedure or its applicability to all businesses that manufacture or market diesel emission control technologies regardless of their location.

### **8.7 Potential Impact to California State or Local Agencies**

The proposed amendments to the Procedure will not create costs or savings, as defined in Government Code section 11346.5 (a)(6), to any State agency or in federal funding to the State, costs or mandate to any local agency or school district whether or not reimbursable by the State pursuant to Part 7 (commencing with section 17500, Division 4, Title 2 of the Government Code), or other non-discretionary savings to local agencies.

### **8.8 Estimated Costs**

As noted previously, the proposed amendments do not change the voluntary nature of the Procedure. Those manufacturers that wish to market diesel emission control strategy devices in California may wish to obtain verification using the Procedure. The Procedure includes emissions and durability testing requirements. The proposed amendments to the Procedure will either cause no change in the cost of testing or potentially reduce the cost if an applicant is approved to use the proposed two-unit durability testing option.

## **9 ENVIRONMENTAL IMPACTS**

No direct environmental impacts can be associated with the staff proposal, as the proposal would simply modify an existing methodology and protocol for evaluating diesel emission control strategies. While the proposed amendments would extend the amount of time that a strategy which does not meet the NO<sub>2</sub> limit would be verified, that period of time falls far short of when significant implementation of strategies is planned. Thus, as discussed in Section 4.2, no significant environmental impacts are expected. Emissions benefits due to use of the strategies evaluated through this Procedure will be estimated as part of the development of regulations or other programs to implement the strategies.

## **10 COST-EFFECTIVENESS**

Because no direct emissions benefits are associated with the staff proposal, no traditional cost effectiveness can be calculated. When staff proposes rules to implement in-use controls for the various categories of diesel engines, it will provide more detailed estimates, taking into account the specific issues associated with each category.

## **11 CONCLUSION**

The proposed amendments to the Procedure, as described herein, would help ARB in its efforts to implement the Diesel Risk Reduction Plan and better protect public health. ARB staff recommends that the Board adopt the proposed amendments to sections 2700 to 2710, Title 13, of the California Code of Regulations, as set forth in the proposed Regulation Order in Appendix A.

## 12 REFERENCES

Air Resources Board. Staff Report: Technical Support Document – Proposed Control Measure for Diesel Particulate Matter From On-Road Heavy-Duty Diesel-Fueled Residential and Commercial Solid Waste Collection Vehicle Diesel Engines. June 6, 2003.

Air Resources Board. Staff Report: Initial Statement of Reasons – Proposed Regulation for the Verification Procedure for In-Use Strategies to Control Emissions from Diesel Engines. March 29, 2002.

Air Resources Board. Diesel Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles. October 2000.

LeTavec, C., Uihlein, J., Segal, J., and Vertin, K. "EC-Diesel Technology Validation Program Interim Report," SAE 2000-01-1854, Society of Automotive Engineers, 2000.

Vertin, K. EC-Diesel Technology Validation Program Master Spreadsheet, Round 2. National Renewable Energy Laboratory. Updated August 21, 2002. Requests for the spreadsheet should be sent to: [teresa\\_alleman@nrel.gov](mailto:teresa_alleman@nrel.gov)

## App ndix A. Proposed Regulation Order

**NOTE:** This document is printed in a style to indicate changes from the adopted regulation. All original language is indicated by plain type. The proposed amendments are shown in underline to indicate additions to the original language and ~~strikeout~~ to indicate deletions. The symbol "\*\*\*\*\*" means that the remainder of the text of the regulation for a specific section is not shown, but has been incorporated by reference, unchanged.

**NOTE:** Adopt Title 13, California Code of Regulations, sections 2701, 2702, 2703, 2704, 2705, 2706 and 2707, to read as follows:

### **Chapter 14. Verification Procedure, Warranty and In-Use Compliance Requirements for In-Use Strategies to Control Emissions from Diesel Engines**

#### **§ 2701. Definitions**

(a) The definitions in Section 1900(b), Chapter 1, Title 13 of the California Code of Regulations are incorporated by reference herein. The following definitions shall govern the provisions of this chapter:

- (1) "15 ppmw or less sulfur fuel" means diesel fuel with a sulfur content equal to or less than 15 parts per million by weight (ppmw).
- (2) "Alternative Diesel Fuel" means any fuel used in diesel engines that is not commonly or commercially known, sold or represented as diesel fuel No. 1-D or No. 2-D, pursuant to the specifications in ASTM Standard Specification for Diesel Fuel Oils D975-81, and does not require engine or fuel system modifications for the engine to operate, although minor modifications (e.g. recalibration of the engine fuel control) may enhance performance. Examples of alternative diesel fuels include, but are not limited to, biodiesel, Fischer Tropsch fuels, and emulsions of water in diesel fuel. Natural gas is not an alternative diesel fuel. An emission control strategy using a fuel additive will be treated as an alternative diesel fuel based strategy unless:
  - (A) The additive is supplied to the vehicle or engine fuel by an on-board dosing mechanism, or
  - (B) The additive is directly mixed into the base fuel inside the fuel tank of the vehicle or engine, or
  - (C) The additive and base fuel are not mixed until vehicle or engine fueling commences, and no more additive plus base fuel combination is mixed than required for a single fueling of a single engine or vehicle.
- (3) "Approach Light System with Sequenced Flasher Lights in Category 1 and Category 2 Configurations" (ALSF-1 and ALSF-2) mean high intensity approach lighting systems with sequenced flashers used at airports to illuminate specified runways during category II or III weather conditions, where category II means a decision height of 100 feet and runway visual

range of 1,200 feet, and category III means no decision height or decision height below 100 feet and runway visual range of 700 feet.

- (4) ~~(3)~~ "Applicant" means the entity that has applied for or has been granted verification under this Procedure.
- (5) ~~(4)~~ "Auxiliary Emission Control Device" (AECD) means any device or element of design that senses temperature, vehicle speed, engine revolutions per minute (RPM), transmission gear, manifold vacuum, or any other parameter for the purpose of activating, modulating, delaying, or deactivating the operation of the emission control system.
- (6) ~~(5)~~ "Average" means the arithmetic mean.
- (7) ~~(6)~~ "Backpressure Monitor" means a device that includes a sensor for measuring the engine backpressure upstream of a hardware-based diesel emission control system or component thereof installed in the exhaust system and an indicator to notify the operator when the backpressure exceeds specified high and in some cases low backpressure limits, as defined by the engine manufacturer or the applicant for verification of a diesel emission control strategy.
- (8) ~~(7)~~ "Baseline" means the test of a vehicle or engine without the diesel emission control strategy implemented.
- (9) ~~(8)~~ "Cold Start" means the start of an engine only after the engine oil and water temperatures are stabilized between 68 and 86 degrees F for a minimum of 15 minutes.
- (10) ~~(9)~~ "Diesel emission control strategy" or "Diesel emission control system" means any device, system, or strategy employed with an in-use diesel vehicle or piece of equipment that is intended to reduce emissions. Examples of diesel emission control strategies include, but are not limited to, particulate filters, diesel oxidation catalysts, selective catalytic reduction systems, fuel additives used in combination with particulate filters, alternative diesel fuels, and combinations of the above.
- (11) ~~(10)~~ "Diesel Emission Control Strategy Family Name."  
See Section 2706(g)(2).
- (12) ~~(11)~~ "Diesel Engine" means an internal combustion engine with operating characteristics significantly similar to the theoretical diesel combustion cycle. The primary means of controlling power output in a diesel cycle engine is by limiting the amount of fuel that is injected into the combustion chambers of the engine. A diesel cycle engine may be petroleum-fueled (i.e., diesel-fueled) or alternate-fueled.
- (13) ~~(12)~~ "Durability" means the ability of the applicant's diesel emission control strategy to maintain a level of emissions below the baseline and maintain its physical integrity over some period of time or distance determined by the Executive Officer pursuant to these regulations. The minimum durability testing periods contained herein are not necessarily meant to represent the entire useful life of the diesel emission control strategy in actual service.
- ~~(13) "Emergency/Standby Engine" means an internal combustion engine used only as follows: (1) when normal power line or natural gas service fails; or~~

- ~~(2) for the emergency pumping of water for either fire protection or flood relief. An engine operated to supplement a primary power source when the load capacity or rating of the primary power source has been either reached or exceeded is not an emergency/standby engine.~~
- (14) "Emergency Standby Engine" means a diesel engine operated solely for emergency use, except as otherwise provided in airborne toxic control measures adopted by the ARB.
- (15) "Emergency Use" means using a diesel engine to provide electrical power or mechanical work during any of the following events and subject to the following conditions:
- (A) The failure or loss of all or part of normal electrical power service or normal natural gas supply to the facility.
  - (B) The failure of a facility's internal power distribution system.
  - (C) The pumping of flood water or sewage to prevent or mitigate a flood or sewage overflow.
  - (D) The pumping of water for fire suppression or protection.
  - (E) The powering of ALSF-1 and ALSF-2 airport runway lights under category II or III weather conditions.
  - (F) Other conditions as specified in airborne toxic control measures adopted by the ARB.
- (16)(14) "Emission control group" means a set of diesel engines and applications determined by parameters that affect the performance of a particular diesel emission control strategy. The exact parameters depend on the nature of the diesel emission control strategy and may include, but are not limited to, certification levels of engine emissions, combustion cycle, displacement, aspiration, horsepower rating, duty cycle, exhaust temperature profile, and fuel composition. Verification of a diesel emission control strategy and the extension of existing verifications are done on the basis of emission control groups.
- (17)(15) "Executive Officer" means the Executive Officer of the Air Resources Board or the Executive Officer's designee.
- (18)(16) "Executive Order" means the document signed by the Executive Officer that specifies the verification level of a diesel emission control strategy for an emission control group and includes any enforceable conditions and requirements necessary to support the designated verification.
- (19)(17) "Fuel Additive" means any substance designed to be added to fuel or fuel systems or other engine-related systems such that it is present in-cylinder during combustion and has any of the following effects: decreased emissions, improved fuel economy, increased performance of the entire vehicle or one of its component parts, or any combination thereof; or assists diesel emission control strategies in decreasing emissions, or improving fuel economy or increasing performance of a vehicle or component part, or any combination thereof. Fuel additives used in conjunction with diesel fuel may be treated as an alternative diesel fuel. See Section 2701 (a)(2).



- (20)(18) "Hot Start" means the start of an engine within four hours after the engine is last turned off. The first hot start test run should be initiated 20 minutes after the cold start for Federal Test Procedure testing following Section 86.1327-90 of the Code of Federal Regulations, Title 40, Part 86.
- ~~(19) "Portable Diesel Fueled Diesel Engine" means a diesel fueled diesel engine which is designed and capable of being carried or moved from one location to another and does not remain at a single location for more than 12 consecutive months. Engines used to propel mobile equipment or a motor vehicle of any kind are not portable engines. Examples of portable diesel fueled engine applications include, but are not limited to cranes, pumps, welders, woodchippers, tactical support equipment (military), power generation sets, pile driving hammers, service or work over rigs, dredges or boats or barges, and compressors. The definitions in Title 13 California Code of Regulations Section 2452(g) and Section 2452(x) are incorporated by reference herein.~~
- (21) "Portable Engine" means an engine designed and capable of being carried or moved from one location to another, except as defined in Section 2701(a)(24). Engines used to propel mobile equipment or a motor vehicle of any kind are not portable. Indicators of portability include, but are not limited to, wheels, skids, carrying handles, dolly, trailer, or platform. A portable engine cannot remain at the same facility location for more than 12 consecutive rolling months or 365 rolling days, whichever occurs first, not including time spent in a storage facility. If it does remain at the facility for more than 12 months, it is considered to be a stationary engine. The definitions in Title 13 California Code of Regulations Section 2452(g) and Section 2452(x) are incorporated by reference herein.
- (22)(20) "Regeneration", in the context of diesel particulate filters, means the periodic or continuous combustion of collected particulate matter that is trapped in a particulate filter through an active or passive mechanism. Active regeneration requires a source of heat other than the exhaust itself to regenerate the particulate filter. Examples of active regeneration strategies include, but are not limited to, the use of fuel burners and electrical heaters. Passive regeneration does not require a source of heat for regeneration other than the exhaust stream itself. Examples of passive regeneration strategies include, but are not limited to, the use of fuel additives and the catalyst-coated particulate filter. In the context of NOx reduction strategies, "regeneration" means the desorption and reduction of NOx from NOx adsorbers (or NOx traps) during rich operation conditions.
- (23)(24) "Revoke" means to cancel the verification status of a diesel emission control strategy. If a diesel emission control strategy's verification status is revoked by the Executive Officer, the applicant must immediately cease and desist selling the diesel emission control strategy to end-users.
- ~~(22) "Stationary Diesel Fueled Diesel Engine" means either a diesel fueled diesel engine that is used in a piece of equipment that is designed to remain in one location for the duration of its useful life, or a diesel fueled diesel engine that is used in a piece of equipment that can be moved from~~

~~one location to another but remains in a single location for more than 12 consecutive months. Examples of stationary applications include, but are not limited, to electric power generator sets, grinders, rock crushers, sand screeners, cranes, cement blowers, compressors, and water pumps. The definitions in Title 13 California Code of Regulations Section 2452(g) and Section 2452(x) are incorporated by reference herein.~~

(24) "Stationary Engine" means an engine that is designed to stay in one location, or remains in one location. An engine is stationary if any of the following are true:

(A) The engine or its replacement is attached to a foundation, or if not so attached, will reside at the same location for more than 12 consecutive months. Any engine that replaces engine(s) at a location, and is intended to perform the same or similar function as the engine(s) being replaced, will be included in calculating the consecutive time period. In that case, the cumulative time of all engine(s), including the time between the removal of the original engine(s) and installation of the replacement engine(s), will be counted toward the consecutive time period; or

(B) The engine remains or will reside at a location for less than 12 consecutive months if the engine is located at a seasonal source and operates during the full annual operating period of the seasonal source, where a seasonal source is a stationary source that remains in a single location on a permanent basis (at least two years) and that operates at that single location at least three months each year; or

(C) The engine is moved from one location to another in an attempt to circumvent the residence time requirements [Note: The period during which the engine is maintained at a storage facility shall be excluded from the residency time determination.] The definitions in Title 13 California Code of Regulations Section 2452(g) and Section 2452(x) are incorporated by reference herein.

(25)(23) "Verification" means a determination by the Executive Officer that a diesel emission control strategy meets the requirements of this Procedure. This determination is based on both data submitted or otherwise known to the Executive Officer and engineering judgement.

NOTE: Authority cited: Sections 39002, 39003, 39500, 39600, 39601, 39650-39675, 40000, 43000, 43000.5, 43011, 43013, 43018, 43105, 43600, and 43700, Health and Safety Code. Reference: Sections 39650-39675, 43000, 43009.5, 43013, 43018, 43101, 43104, 43105, 43106, 43107, and 43204-43205.5 Health and Safety Code; and Title 17 California Code of Regulations Section 93000.

## § 2702. Application Process

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(b) Proposed Verification Testing Protocol. Before formally submitting an application for the initial verification of a diesel emission control strategy, the applicant must submit a proposed verification testing protocol at the Executive Officer's discretion. The Executive Officer shall use the information in the proposed protocol to help determine whether the strategy relies on sound principles of science and engineering to control emissions, the need for additional analyses, and the appropriateness of allowing alternatives to the prescribed requirements. The protocol should include the following information:

- (1) Identification of the contact persons, phone numbers, names and addresses of the responsible party proposing to submit an application.
- (2) Description of the diesel emission control strategy's principles of operation. A schematic depicting operation should be included as appropriate. It is the responsibility of the applicant to demonstrate that its product relies on sound principles of science and engineering to achieve emission reductions.

(A) If, after reviewing the proposed protocol, the Executive Officer determines that the applicant has not made a satisfactory demonstration that its product relies on sound principles of science and engineering to achieve emission reductions, the Executive Officer shall notify the applicant of the determination in writing. The applicant may choose to withdraw from the verification process or submit additional materials and clarifications. The additional submittal must be received by the Executive Officer no later than 60 days from the date of the notification letter or the application may be suspended.

(B) If, after reviewing the additional submittal, the Executive Officer determines that the applicant has not yet made a satisfactory demonstration that its product relies on sound principles of science and engineering to achieve emission reductions, the application shall be suspended. If an application has been suspended, it may only be reactivated at the discretion of the Executive Officer.

(C) If at any time, the Executive Officer has reason to doubt the scientific or engineering soundness of a product, the Executive Officer may require the applicant to submit additional supporting materials and clarifications no later than 60 days from the date of the notification letter. If the additional submittal is not received by the Executive Officer by the deadline established in the notification letter, the application may be suspended or the existing verification may be revoked. In deciding whether to suspend an application or revoke an existing verification the Executive Officer will review submittals as provided in subsection (B) above.

- (3) Preliminary parameters for defining emission control groups that are appropriate for the diesel emission control strategy. The Executive Officer

will work with the applicant to determine appropriate emission control group parameters.

- (4) The applicant's plan for meeting the requirements of Sections 2703-2706. Existing test data may be submitted for the Executive Officer's consideration. The protocol must focus on verification of the diesel emission control strategy for use with a single emission control group.
- (5) A brief statement that the applicant agrees to provide a warranty pursuant to the requirements of Section 2707.

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NOTE: Authority cited: Sections 39002, 39003, 39500, 39600, 39601, 39650-39675, 40000, 43000, 43000.5, 43011, 43013, 43018, 43105, 43600, and 43700, Health and Safety Code. Reference: Sections 39650-39675, 43000, 43009.5, 43013, 43018, 43101, 43104, 43105, 43106, 43107, and 43204-43205.5 Health and Safety Code; and Title 17 California Code of Regulations Section 93000.

### § 2703. Emission Testing Requirements.

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#### (e) Test Cycle.

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- (2) Off-road Engines and Equipment (including portable engines). For off-road diesel-fueled vehicles and equipment, the applicant must follow the steady-state test cycle procedure outlined in the ARB off-road regulations (California Code of Regulations, Title 13, Section 2423 and the incorporated California Exhaust Emission Standards and Test Procedures for New 2000 and Later Off-Road Compression-Ignition Engines, Part I-B). A minimum of three hot-start tests must be conducted using the specified for each appropriate test cycle. Applicants may request that the Executive Officer consider alternative test cycles, as described in subsection (f).
- (3) Stationary Engines. For stationary engines, the applicant must follow the steady-state test procedure outlined in the ARB off-road regulations use the most appropriate off-road test cycle (as referenced in (2) above). ~~representing the operating conditions of the application, with approval from the Executive officer.~~ A minimum of three hot-start tests must be conducted using the specified for each appropriate test cycle. Applicants may request that the Executive Officer consider alternative test cycles and methods, as described in subsection (f).
- (f) Alternative Test Cycles and Methods. The applicant may request the Executive Officer to approve an alternative test cycle or method in place of a required test cycle or method. In reviewing this request, the Executive Officer may consider all relevant information including, but not limited to, the following:

- (1) Test procedures specified in airborne toxic control measures adopted by the ARB, e.g. the Airborne Toxic Control Measure for Stationary Compression Ignition Engines.
- (2) Similarity of average speed, percent of time at idle, average acceleration, and other characteristics to the specified test cycle or method and in-use duty cycle,
- (3) Body of existing test data generated using the alternative test cycle or method,
- (4) Technological necessity, and
- (5) Technical ability to conduct the required test.

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NOTE: Authority cited: Sections 39002, 39003, 39500, 39600, 39601, 39650-39675, 40000, 43000, 43000.5, 43011, 43013, 43018, 43105, 43600, and 43700, Health and Safety Code. Reference: Sections 39650-39675, 43000, 43009.5, 43013, 43018, 43101, 43104, 43105, 43106, 43107, and 43204-43205.5, Health and Safety Code; and Title 17 California Code of Regulations Section 93000.

#### § 2704. Durability Testing Requirements

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Table 3. Minimum Durability Demonstration Periods

Engine Type	Minimum Durability Demonstration Period
On-Road	50,000 miles or 1000 hours
Off-Road (including portable engines) and Stationary	1000 hours
Stationary emergency generator <u>Stationary Emergency Standby Engines</u>	500 hours

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- (g) Test Run. The requirements for emissions reduction testing are summarized in Table 4, below.

- (1) The diesel emission control strategy must undergo one set of emission tests before beginning and after completion of the service accumulation. Baseline testing with test repetitions as indicated in Table 4 must be conducted for either the initial test or the final test, but is suggested for

both. If there are substantial test data from previous field studies or field demonstrations, applicants may request that the Executive Officer consider these in place of the initial emission tests.

- (2) As an alternative to testing a single unit before and after the service accumulation period, the applicant may request that the Executive Officer consider the testing of two identical units, one that has been pre-conditioned and another that has completed the service accumulation period. In reviewing the request, the Executive Officer may consider all relevant information, including, but not limited to, the following:
- (A) The effect of the diesel emission control strategy on engine operation over time. Strategies that cause changes in engine operation are likely not to qualify for this testing option.
  - (B) The quality of the evidence the applicant can provide to support that the two units are identical.
  - (C) Previous experience with similar or related technologies, and
  - (D) Whether the applicant is participating in the U.S. EPA verification process and has made an agreement with U.S. EPA to test two units.
- (3) For strategies that include exhaust aftertreatment, engine backpressure and exhaust temperature must be measured and recorded on a second-by-second basis (1 Hertz) during at least one baseline run and each of the control test runs.

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NOTE: Authority cited: Sections 39002, 39003, 39500, 39600, 39601, 39650-39675, 40000, 43000, 43000.5, 43011, 43013, 43018, 43105, 43600, and 43700, Health and Safety Code. Reference: Sections 39650-39675, 43000, 43009.5, 43013, 43018, 43101, 43104, 43105, 43106, 43107, and 43204-43205.5 Health and Safety Code; and Title 17 California Code of Regulations Section 93000.

## **§ 2705. Field Demonstration Requirements.**

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### **(b) Test Period.**

- (1) For on- and off-road engines, and stationary engines not used in emergency generators, a vehicle or piece of equipment must be operated with the diesel emission control strategy installed for a minimum period of 200 hours or 10,000 miles, whichever occurs first.
- (2) For stationary emergency generators standby engines, the emission control system must remain in the field for at least 30 days and operation must include:
  - (A) 12 maintenance runs (allowing for engine cool down between runs), and
  - (B) a minimum of two separate 4 hour sessions where the engine is operated under load (allowing engine cool down between runs).

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NOTE: Authority cited: Sections 39002, 39003, 39500, 39600, 39601, 39650-39675, 40000, 43000, 43000.5, 43011, 43013, 43018, 43105, 43600, and 43700, Health and Safety Code. Reference: Sections 39650-39675, 43000, 43009.5, 43013, 43018, 43101, 43104, 43105, 43106, 43107, and 43204-43205.5 Health and Safety Code; and Title 17 California Code of Regulations Section 93000.

## § 2706. Other Requirements.

### (a) Limit and Procedure for Measuring Nitrogen Dioxide (NO<sub>2</sub>).

- (1) The post-control NO<sub>2</sub> emissions must not exceed 20 percent of the total baseline (pre-control) NO<sub>x</sub> emissions on a mass basis, from the same test cycle(s) for emission testing from Section 2703 (e). This limit takes effect beginning on January 1, ~~2007~~2004. Diesel emission control strategies verified and installed prior to January 1, ~~2007~~2004 are exempted from this requirement. Those verified prior to January 1, ~~2007~~2004 will no longer be allowed for installation after January 1, ~~2007~~2004 unless they meet the NO<sub>2</sub> emission limit. After January 1, ~~2007~~2004, all diesel emission control strategies verified and installed must meet this requirement.
- (2) NO<sub>2</sub> emissions are to be quantified by one of the following methods:
  - (A) Two chemiluminescence analyzers,
  - (B) A dual-path chemiluminescence analyzer, or
  - (C) An alternative method approved by the Executive Officer.
- (3) For (2)(A) and (2)(B), the analyzers are to be fed from a heated and conditioned sample path. If two chemiluminescence analyzers are employed, they are to be simultaneously fed from a common heated sample path. One instrument (or path) shall be set to NO<sub>x</sub> mode, while the second shall be set to nitric oxide (NO) mode. The instrument (or path) set to NO<sub>x</sub> mode receives a sample that has passed through an NO<sub>2</sub>-to-NO converter, and the resultant concentration is designated as total NO<sub>x</sub> (NO+NO<sub>2</sub>) in the sample. The instrument (or path) that is set to NO mode receives a sample that has not passed through the converter and quantifies the amount of NO only. The difference between NO and NO<sub>x</sub> is the amount of NO<sub>2</sub> in the sample. Both NO and NO<sub>x</sub> signals are recorded by an external data acquisition system at 1 Hertz. ~~The column data for each NO and NO<sub>x</sub> signal is then adjusted for time delays that are inherent in both the instruments and the sample paths. Once the data file is aligned, a subtraction of NO from NO<sub>x</sub> is performed on a second by second basis. The result of this subtraction is then integrated over the entire test run. The result of this integration is the amount of NO<sub>2</sub> over the entire test cycle in parts per million (ppm). Using the average concentrations of NO and NO<sub>x</sub> over the entire test cycle, the conventional~~ The equation for calculating total NO<sub>x</sub> (Code of Federal Regulations, Title 40, part 86, Subpart N) is then used to generate a gram per mile or g/bhp-

hr NO<sub>2</sub> value for both NO and NO<sub>x</sub>. The resulting value for NO is then subtracted from that for NO<sub>x</sub> to determine the gram per mile or g/bhp-hr value for NO<sub>2</sub>. The instrument for measuring NO and NO<sub>x</sub> must be calibrated in accordance with the NO<sub>x</sub> calibration procedure as described in the Code of Federal Regulations, Title 40, part 86, Subpart N.

- (4) Alternative Method to Measure NO<sub>2</sub>. The applicant may request the Executive Officer to approve an alternative method in place of the required methods. In reviewing this request, the Executive Officer may consider all relevant information including, but not limited to, the following:
- (A) Correlation of the alternative method with the methods stated in 2(A) or 2(B).
  - (B) Body of existing data generated using the alternative method.

(b) Limits on Other Pollutants

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(2) Limit on CO.

- (A) On-road and Off-road (including portable) Engines. In order for a diesel emission control strategy to be verified, the diesel emission control strategy must not increase the emissions of CO greater than the current CO emission standards for new diesel engines adopted by the Air Resources Board and in effect at the time of verification.
- (B) Stationary Engines. In order for a diesel emission control strategy to be verified, the diesel emission control strategy must not increase the emissions of CO by more than 10 percent of the baseline emissions level as reported under Section 2708(a).

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NOTE: Authority cited: Sections 39002, 39003, 39500, 39600, 39601, 39650-39675, 40000, 43000, 43000.5, 43011, 43013, 43018, 43105, 43600, 43700, and 43830.8 Health and Safety Code. Reference: Sections 39650-39675, 43000, 43009.5, 43013, 43018, 43101, 43104, 43105, 43106, 43107, and 43204-43205.5 Health and Safety Code; Section 71017, Public Resources Code; and Title 17 California Code of Regulations Section 93000.

**§ 2707. Warranty Requirements.**

(a) (1) Product Warranty.

- (A) The applicant must warrant to all owners, for ownership within the warranty period and lessees, for lease contract within the warranty period, that its verified diesel emission control strategy is free from defects in design, materials, workmanship, or operation of the diesel emission control strategy which cause the diesel emission control strategy to fail to conform to the emission control performance level it



was verified to, or to the other requirements of Sections 2700-2706, and 2710 for the minimum periods shown in Table 5, provided the operation of and conditions of use for the vehicle, equipment, engine, and diesel emission control strategy conform with the operation and conditions specified in the ARB's Executive Order.

- (B) For each engine type and size listed in Table 5, the minimum defects warranty period is terminated by that listed event which occurs first. The warranty must cover the full repair or replacement cost of the diesel emission control strategy, including parts and labor.
- (C) The warranty must also cover the full repair or replacement cost of ~~to returning the vehicle, equipment, or engine~~ components to the condition they were in prior to the failure, including parts and labor, for damage to the engine ~~or other vehicle components~~ proximately caused by the verified diesel emission control strategy. Repair or replacement of any warranted part, including the engine ~~and other parts~~, must be performed at no charge to the vehicle or engine owner. This includes only those relevant diagnostic expenses in the case in which a warranty claim is valid. The applicant may, at its option, instead pay the fair market value of the ~~vehicle, equipment, or engine~~ prior to the time the failure occurs.
- (D) The repair or replacement of any warranted part otherwise eligible for warranty coverage, ~~may be excluded from such warranty coverage at the applicant's discretion if the applicant demonstrates that the diesel emission control strategy, vehicle or engine has been abused, neglected, or improperly maintained, and that such abuse, neglect, or improper maintenance was the direct cause of the need for the repair or replacement of the part.~~
- (E) Failure of the vehicle or engine owner to ensure scheduled maintenance or to keep maintenance records for the vehicle, equipment, engine, or diesel emission control strategy may, but shall not per se, be grounds for disallowing a warranty claim.

## (2) Installation Warranty

- (A) A person or company who installs a verified diesel emission control strategy must warrant that the installation is free from defects in workmanship or materials which cause the diesel emission control strategy to fail to conform to the emission control performance level it was verified to or the other requirements of sections 2700-2706 for the minimum time periods shown in Table 5.
- (B) For each engine type and size listed in Table 5, the minimum defects warranty period is terminated by that listed event whichever occurs first. The extent of the warranty coverage provided by installers must be the same as the warranty provided by the applicant as established in subsection (a)(1) and the same exclusions must apply.

Table 5. Minimum Warranty Periods

Engine Type	Engine Size	Minimum Warranty Period
On-Road	Light heavy-duty, 70 to 170 hp, Gross Vehicle Weight Rating (GVWR) less than 19,500 lbs.	5 years or 60,000 miles
	Medium heavy-duty, 170 to 250 hp, GVWR from 19,500 lbs. to 33,000 lbs.	5 years or 100,000 miles
	Heavy heavy-duty, exceeds 250 hp, GVWR exceeds 33,000 lbs.	5 years or 150,000 miles
Off-Road (includes portable engines) and Stationary	Under 25 hp, and for constant speed engines rated under 50 hp with rated speeds greater than or equal to 3,000 rpm	3 years or 1,600 hours
	At or above 25 hp and under 50 hp	4 years or 2,600 hours
	At or above 50 hp	5 years or 4,200 hours

(b)(1) Product Warranty Statement. The applicant must furnish a copy of the following statement in the owner's manual.

#### YOUR WARRANTY RIGHTS AND OBLIGATIONS

(Applicant's name) must warrant the diesel emission control system in the application for which it is sold or leased to be free from defects in design, materials, workmanship, or operation of the diesel emission control system which cause the diesel emission control system to fail to conform to the emission control performance level it was verified to, or to the requirements in the California Code of Regulations, Title 13, Sections 2700 to 2706, and 2710, for the periods of time listed below, provided there has been no abuse, neglect, or improper maintenance of your diesel emission control system, vehicle or equipment, as specified in the owner's manuals. Where a warrantable condition exists, this warranty also covers the engine ~~other vehicle or equipment parts~~ from damage caused by the diesel emission control system, subject to the same exclusions for abuse, neglect or improper maintenance of your vehicle or equipment. Please review your owner's manual for other warranty information. Your diesel emission control system may include a core part (e.g., particulate filter, diesel oxidation catalyst, selective catalytic reduction converter) as well as hoses, connectors, a back pressure monitor (if applicable), and other emission-related assemblies. Where a warrantable condition exists, (applicant's name) will repair or replace your diesel emission control system at no cost to you including diagnosis, parts, and labor.

### WARRANTY COVERAGE:

For a (engine size) engine used in a(n) (type of application) application, the warranty period will be (years or hours or miles of operation) whichever occurs first. If any emission-related part of your diesel emission control system is defective in design, materials, workmanship, or operation of the diesel emission control system thus causing the diesel emission control system to fail to conform to the emission control performance level it was verified to, or to the requirements in the California Code of Regulations, Title 13, Sections 2700 to 2706, and 2710, within the warranty period, as defined above, (Applicant's name) will repair or replace the diesel emission control system, including parts and labor.

In addition, (applicant's name) will replace or repair the ~~vehicle, equipment, or~~ engine components to the condition they were in prior to the failure, including parts and labor, for damage to the engine ~~or other vehicle components~~ proximately caused by the verified diesel emission control strategy. This also includes those relevant diagnostic expenses in the case in which a warranty claim is valid. (Applicant's name) may, at its option, instead pay the fair market value of the ~~vehicle, equipment, or engine~~ prior to the time the failure occurs.

### OWNER'S WARRANTY RESPONSIBILITY

As the (vehicle, engine, equipment) owner, you are responsible for performing the required maintenance described in your owner's manual. (Applicant's name) recommends that you retain all maintenance records and receipts for maintenance expenses for your vehicle, engine, or equipment, and diesel emission control system. If you do not keep your receipts or fail to perform all scheduled maintenance, (applicant's name) may have grounds to deny warranty coverage. You are responsible for presenting your vehicle, equipment, or engine, and diesel emission control system to a (applicant's name) dealer as soon as a problem is detected. The warranty repair or replacement should be completed in a reasonable amount of time, not to exceed 30 days. If a replacement is needed, this may be extended to 90 days should a replacement not be available, but must be performed as soon as a replacement becomes available.

If you have questions regarding your warranty rights and responsibilities, you should contact (Insert chosen applicant's contact) at 1-800-xxx-xxxx or the California Air Resources Board at 9528 Telstar Avenue, El Monte, CA 91731, or (800) 363-7664, or electronic mail: [helpline@arb.ca.gov](mailto:helpline@arb.ca.gov).

- (b)(2) Installation Warranty Statement. The installer must furnish the owner with a copy of the following statement.

### YOUR WARRANTY RIGHTS AND OBLIGATIONS

(Installer's name) must warrant that the installation of a diesel emission control system is free from defects in workmanship or materials which cause the diesel emission control system to fail to conform to the emission control performance level it was verified to, or to the requirements in the California Code of Regulations, Title 13, Sections 2700 to 2706. The warranty period and the extent of the warranty coverage provided by (installer's name) must be the same as the warranty provided by the product manufacturer, and the same exclusions must apply.

### OWNER'S WARRANTY RESPONSIBILITY

As the vehicle, engine, or equipment owner, you are responsible for presenting your vehicle, engine, or equipment, and diesel emission control system to (installer's name) as soon as a problem with the installation is detected.

If you have questions regarding your warranty rights and responsibilities, you should contact (Insert chosen installer's contact) at 1-800-xxx-xxxx or the California Air Resources Board at 9528 Telstar Avenue, El Monte, CA 91731, or (800) 363-7664, or electronic mail: [helpline@arb.ca.gov](mailto:helpline@arb.ca.gov).

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NOTE: Authority cited: Sections 39002, 39003, 39500, 39600, 39601, 39650-39675, 40000, 43000, 43000.5, 43011, 43013, 43018, 43105, 43600, and 43700, Health and Safety Code. Reference: Sections 39650-39675, 43000, 43009.5, 43013, 43018, 43101, 43104, 43105, 43106, 43107, and 43204-43205.5 Health and Safety Code; and Title 17 California Code of Regulations Section 93000.